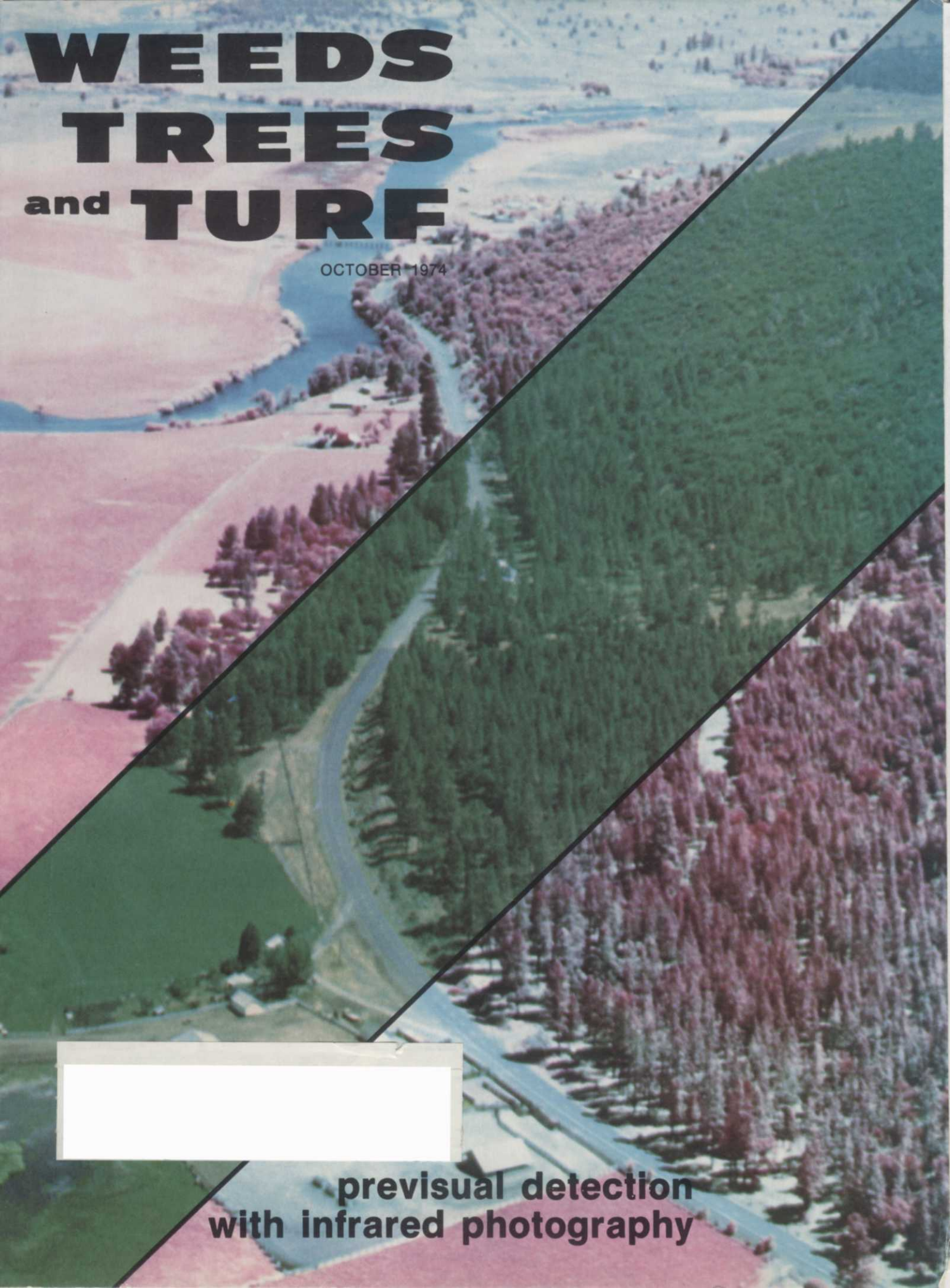
WEEDS TREES and TURF

OCTOBER 1974



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WEEDS TREES and TURF®

October 1974, Vol. 13, No. 10

THE COVER—Two identical aerial photographs, one in normal color, the other infrared color, were combined to illustrate a unique property of infrared film. The pine trees in the lower right corner are infected with a fungus disease. The infrared reflection difference between the healthy trees and the diseased trees is registered on the infrared film. See page 34 for related pictures and story.

FOAM OR SPRAY? Economics of Growth Regulator Application—A technical paper on the economic utility of plant growth inhibitors. Plant specialist Henry Hield, examines the growth reduction characteristics of the chemical Alar on oleander shrubs **12**

OLD FRIENDS, NEW IDEAS AND CHANGING TIMES—A report on the 50th Golden Anniversary meeting of the International Shade Tree Conference, August 18-22, Atlanta, Ga. **14**

ARBORIST IN THE WITNESS CHAIR—A dead tree, an angry property owner, a lawsuit. An expert treeman is called into court to give testimony on the probable cause of the tree's death. An "expert" expert witness gives future witnesses a few pointers on court procedures. **16**

INFRARED AERIAL PHOTOGRAPHY—Easier than you Think—Heat sensitive infrared film has many practical applications for the golf course superintendent, forester or city park manager. William Wildman and J. K. Clark illustrate the basic techniques involved in infrared aerial photography. **34**

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editorial

This month's cover story on page 34 seems almost as far removed from us as a rocket to the moon. Yes, it is the brave new technology we've been hearing more and more about since 1950 . . . the technology which always seems so distant to our everyday lives. Lasers, heart transplants, nuclear reactors, solid fuel propellents, biological control, computers . . . and infrared photography.

Two decades ago, after-dinner speakers were delighting their audiences with forecasts of the world changing so fast we could barely keep up. It will be a button world, they would say, with major cities only minutes away by rocket. Weather will be under man's control and food will consist of multi-colored tablets (one for breakfast, one for lunch and one for dinner).

The predictions, of course, were often incorrect — due to many of our giddy feelings in the post-war boom. But, as all science forecasters through the years have found, the most common error was lack of imagination rather than too much imagination. It was easy to predict that man would someday visit the moon through rocket power. But how many forecasters imagined that the first men on the moon would be seen and heard by everyone on earth through television?

The technological developments all along have been even more startling than predictions. But, often we are unable to recognize the significance of change because of its gradual movement.

It was almost unnoticed last month when a military jet covered the Atlantic in about two hours. A fantastic new technology, with all our expectations, has become a part of our lives without our notice. Kitchen ovens that clean themselves, adding machines you can carry in your pocket, and remote control toy powerboats that sell for $7.

The point is — this technology is not as far from our life and work as we might imagine. The very words you're reading now were set by computer. A space age idea . . . at work today.

The infrared possibilities are like that. It is not an experimental technique. It is not simply a tool for science. Right now, infrared photography is and can be a tool for management in the green industry. If you will, this is space age technology for practical use.

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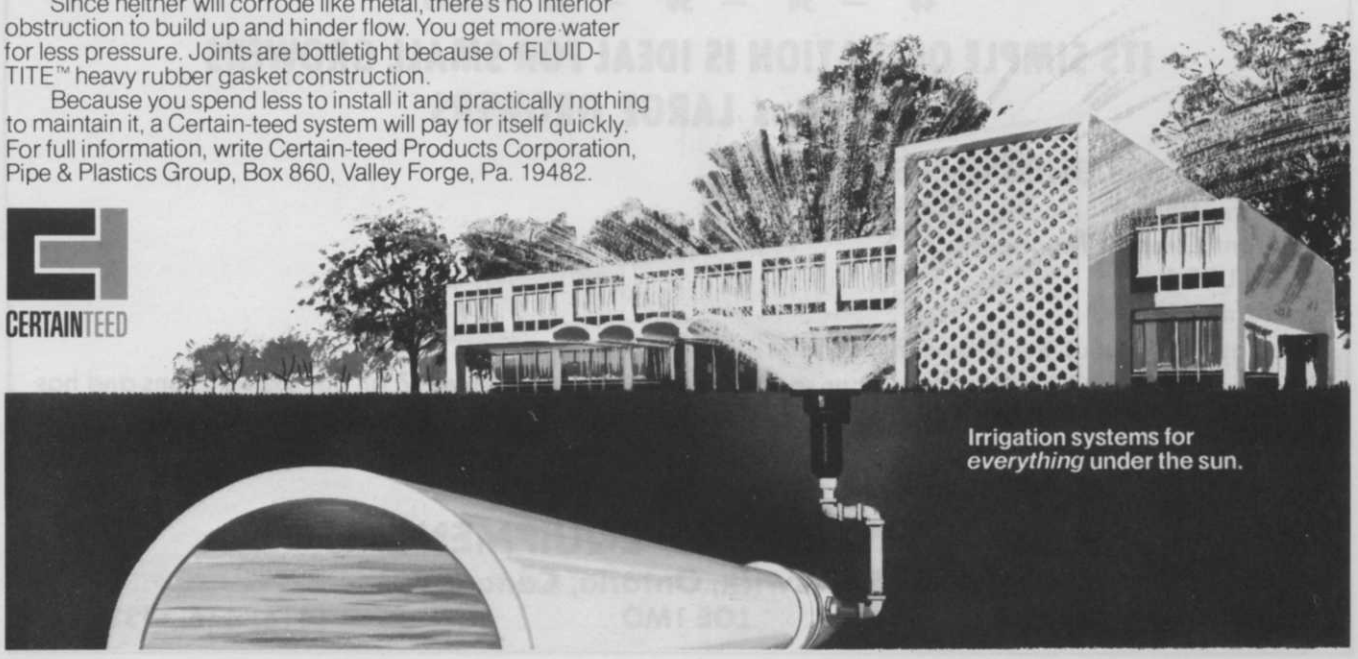

Make the fifth season your catch-up season.

The fifth season is "Davey Season." It starts when valuable trees lose their leaves and go dormant. It runs into the first budding of spring.

Right now, during the fifth season, is a good time to call Davey about your tree needs. We can make surveys and cost estimates – without obligation. We can help you plan your tree maintenance budget through the early months of 1975. Or we can set up programs to give immediate attention to your current needs.

With civic and recreation areas less crowded, Davey Season is a low-cost time to catch up on tree work that didn't get done during busy summer months.

Our trained crews are fully equipped with specialized equipment to quickly and efficiently plant new trees, remove dangerous old trees, prune deadwood from pedestrian paths, grind stumps below ground level, clear around streetlights, or remove brush and growth encroaching on paths and fairways.

Use the Davey Season to get back on schedule or to get a head start on next year's tree work. Call your local Davey representative for help in organizing and budgeting for your tree service needs. He's in the Yellow Pages under Tree Service.

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Coast to Coast and Canada

For More Details Circle (119) on Reply Card

Government News / Business

State governments fearful that job safety and health enforcement will not be returned to their control were assured by OSHA head, John H. Stender, that their "fears are unfounded." Stender conceded that "many are fearful that such a return (of enforcement activity) to the states will mean a return to the same casual treatment of job safety and health that was the rule in most states in pre-OSHA days." He said management of state plans at the federal level including programs of monitoring and evaluation, will prevent any return to the "slipshod enforcement of the old days." Stender addressed his remarks to a labor-management audience in Honolulu.

States with federally-approved job safety and health plans must adopt record-keeping and reporting regulations which are substantially identical to federal standards. OSHA boss, John Stender, said, however, that states at their option may extend the federal requirements to employers with seven or fewer employees. OSHA exempted these employers from the requirements in 1973 to ease the paperwork burden for small businesses.

Sierra Chemical Company is opening a new and expanded international headquarters office and production facility. Their former location at Newark, California has been closed. The new facility is located at 1001 Yosemite Drive, Milpitas, California 95035.

Department of Transportation's Office of Hazardous Materials has received enough industry feedback to schedule a two-day conference on the transportation of hazardous materials. The meeting, slated for October 2-3, will include information on general regulatory compliance, international issues and transport of radioactive materials. Further information is available from the Office of Hazardous Materials, Department of Transportation, Washington, D. C. 202-426-0656.

Dr. John V. Osmun, EPA's director of pesticide programs, has returned to Purdue University. He began sabbatical leave July 1, 1972 and served as a consultant with the Cooperative State Research Service of USDA. Osmun then moved over to head EPA's pesticide programs. He will return to Purdue and resume duties in the entomology department where he has been a staff member for 24 years.

Collier Carbon and Chemical Corp., is constructing a new fertilizer plant in Kenai, Alaska. The $165 million project will produce 1,500 tons of anhydrous amonia per day and 1,200 tons of urea. Collier, a subsidiary of Union Oil Co., plans to ship the fertilizer to west coast markets.

Have you noticed lately that most everytime you go somewhere, you see another Ditch Witch — being pulled along a road or highway to a job or at work in a variety of job situations?

There's a good reason why this is so. For a lot of people, the words "Ditch Witch" have become synonymous with the words "trenching machine." It's a Ditch Witch, not a trencher. There's a good reason for that, too. Ditch Witch designed and built the world's first service-line trencher, more than 25 years ago. Lots of us started business with one of the Ditch Witch models and have stayed with Ditch Witch through the years.

For today's trenching needs, Ditch Witch offers two compact handlebar models, the C and the M; and two four-wheel drive trenchers, the J20 and V30. If your job calls for digging trench, each of these models can do the job for you more efficiently and economically than anything in their respective classes.

That's why Ditch Witch outsells everything in its class.*

Of course, Ditch Witch doesn't limit its line just to trenchers.

There is a full range of vibratory plows (from 25 to 195 horsepower). And the Ditch Witch Modularmatic Series, utilizing a basic vehicle with interchangeable socket-mount working modules, permitting one machine to perform a wide range of underground jobs (including trenching).

Next time you go some place, be on the lookout. You'll probably say . . .

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*Based on U.S. Department of Commerce figures

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Just one application in early spring will control weeds for a full season. In the case of *Poa annua,* another application in late summer keeps this late germinating pest out of sight.

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For those areas where broadleaf weeds are a problem, use Dacamine Turf herbicide to sustain your Total Turf Care. Postemergence Dacamine kills dandelion, plantain, poison ivy, knotweed and other broadleaf weeds.

Dacamine is an oil soluble diamine form of 2,4-D which is formulated to be used *only* with water. It combines the weed-killing power of an ester with the safety of an amine. Dacamine stays put—kills the weeds you spray it on but won't vaporize and damage valuable plants nearby. Its unique formulation penetrates waxy weed foliage—then moves all the way to the roots, killing the whole plant not just the top.

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Total Turf Care includes broad-spectrum disease control. Daconil 2787 is the one fungicide that solves most disease problems. Why use a group of fungicides to do what Daconil 2787 can do by itself?

Use Daconil 2787 to prevent or cure: Brown Patch, Copper Spot, Dollar Spot, Leaf Spot, Melting Out, Red Thread and more. Many leading golf courses use Daconil 2787 in their disease prevention program.

Daconil 2787 has performed well on over 25 grass species and varieties. Excellent turf tolerance allows you to use it even in hot, humid weather.

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FOAM OR SPRAY?

Economics of Growth Regulator Application

By HENRY HIELD, Specialist with the Department of Plant Sciences,
University of California, Riverside

ECONOMIC UTILITY of certain plant growth regulators is frequently limited by the high concentrations required for effective response. Alar is an example of such a case. This chemical possesses desirable characteristics in that it may cause vegetative growth reduction, primarily from shortening internode length, and it causes neither leaf deformity nor reduction of flowering.

Greenhouse trials conducted with Alar applied in heavy foams showed that the effective Alar concentration could be reduced from 1% to .5%.[1] The advantage of the foam application was related to the lengthening of wetting which allowed a longer time when the chemical solution might enter the plant. As the foam breaks, the liquid solution drains over the foliage and is available for entry. Tests with growth regulators have shown that the greatest uptake is during the wetting of the spray.[2]

This report gives results of further experiments conducted on commercial landscape and freeway plantings.

Procedure: Trials had four or five replications of treatments with plot size of one to five plants. Sprays were applied with a field gun or by a backpack sprayer. Preliminary trials were conducted testing several methods of foam expansion. This equipment consisted of either aerating spray nozzles or foam-generating pumps. The Waukeshau foam generator pump produced a suitable foam and was used in the foam application.

Foam: Foams differ in their stability under varying temperatures, their capacity for expansion, their degree of phytotoxicity to the plant, and in their compatability with commercial growth regulator formulations.

The foams were tested approximately at 60 fold expansion. Temperatures above 70 degrees F., high radiant energy and wind decreased the persistence of the foams. Commercially available foaming agents were tested and no attempt was made to characterize the potentially desirable ingredients of these foaming agents. The Alar was used as the 80% wettable powder.

Results: Six foaming agents were compared for their effectiveness in increasing the growth reduction of Alar on oleander. These foam applications were applied on December 21 when temperatures ranged from 45 to 65 dregrees F. with a maximum wind of four mph. The minutes to dryness of the one percent Alar in foam, for the foams which showed greater growth reduction on April 11, were: Fomex, 32; Jet X, 107; and Fomark, 265. These three foaming agents were tested in further experiments since they showed the greatest growth reduction with the Alar.

A comparison of the oleander shoot growth reductions from treatments with 1% Alar in combination with X-77 adjuvant, Jet X foam, or Amchem LoDrift spray additives are shown in Table 1. The LoDrift (alone or with Alar), Alar plus X-77 and foam only treatments were ineffective for reducing growth. Alar applications in both 1% and 1.25% Jet X foam showed a growth reduction on both marked shoots and on plant height for seven months with the two spray applications.

Foam application of Alar on a freeway median planting of Oleander. The foam expansion is by a Waukeshau foam generator.

A compact Oleander plant at the left showing growth retardation at 107 days after treatment with 1% Alar in 1% Jet X foam. The longer internode length and greater height of the untreated control is shown to the right. The Alar in foam treated plant is starting to make normal growth.

A recently trimmed oleander hedge was used to compare a spray of 2% Alar plus .1% X-77 with a foam application of 2% Alar in 1% Fomark (Table 2). Treatments were also made with sprays of the growth inhibitor NIA 10656. In this experiment both Alar in foam and the NIA 10656 treatments caused good growth reductions and resulted in a more dense hedge wall than either the Alar plus X-77 or control treatments. An oleander hedge does not bloom because of frequent prunings. The potential use of NIA 10656 is practical under these conditions since it inhibits flowering as well as vegetative growth. The inhibitor treatment is less desirable when oleander is not hedged and flowering is desired.

A comparison of Alar in Jet X foam and Alar in Jet X unexpounded foaming agent is shown in Table 3. It was possible to apply the Jet X as a spray (not foaming) by CO_2 pressure displacement on the spray mixture. While the treatment with Alar in foam showed less

(continued on page 22)

Table 1: Growth reductions of oleander from various Alar treatments applied 3-5-73 with retreatment 7-10-73.

	Shoot growth cm							Plant height cm
	Days after treatment							
Treatment	44	73	99	127	157(30)[1]	183(56)	224(87)	224
1. 1% Alar + 0.1% X-77	3.6a[4]	9.5b	23.8b		44.1c	51.5a	73.6a	155ab
2. 1% Alar + 1% Jet X foam	2.2a	6.3c	15.8c		32.8c	36.4b	56.0b	134b
3. 1% Alar + 1.25% Jet X foam	2.9a	6.2c	13.3c	Re-	32.7c	35.4b	50.5b	125b
4. 1% Alar + Lo Drift[2]	5.0b	13.9a	29.4ab	spray	52.9ab	59.2a	76.2a	155ab
5. 1.25% Jet X foam	4.6b	13.7a	30.0a		59.6a	64.8a	83.9a	165a
6. 0.25% Lo Drift[3]					54.5ab	61.5a	81.5a	158a
7. Control	4.9b	14.3a	28.3ab		55.9ab	61.6a	85.4a	167a

[1] Days after retreatment shown in parenthesis.
[2] Lo Drift at 1% on 3-5-73 spray and 0.25% on 7-10-73 respray.
[3] Shoots marked but not treated on 3-5-73 and treated 7-10-73.
[4] Duncan's multiple range mean separation, 1% level, for each day period.

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A special exhibit area in the Marriot Hotel, Atlanta, GA, featured the latest developments in tree care equipment, fertilizers and educational materials. There were 39 commercial exhibitors, 24 field exhibitors and 18 educational exhibits.

ISTC Convention Report

Old friends, New ideas and Changing times

THE DAYS when an arborist talked of a "five dollar job and two small ones" have long since passed. But as A. E. Price reminisced through 54 years of tree work, those people of a younger generation attending the International Shade Tree Conference's 50th Golden Anniversary Convention were reminded that times have changed.

Changed indeed. William E. Wallner, professor of entomology, Michigan State University, told the audience at Tuesday's educational session of two recent developments dictating changes in shade tree pest control.

"The attitudes toward pesticides which spawned enactment of the Federal Environmental Pesticides Control Act (FEPCA) in the U.S. in October 1972, and worldwide demands for non-chemical pest control alternatives will be the driving forces for at least the next decade. The practicing arborist or plant protection specialist finds himself confused by the practicality of initiating or implementing new insect control techniques and threatened by impending regulations and legislation," he said.

Wallner also stressed the waning interest of chemical control materials research by university, state and federal sources. "Perhaps most critical is the lack of support by the chemical industry itself to encourage efficacy programs for non-food minor crops. The current trend among shade tree and ornamental researchers is to zero in on two or three major tree pests rather than attempting to research a diverse number of pests," Wallner said.

He emphasized preservation of pesticide availability by "reducing misuse or questionable use patterns since they will likely influence the future categorization of a chemical. The intent of FEPCA is to encourage proper pesticide usage, meaning that unwarranted applications such as routine protective sprays in the absence of a problem will be suspect," he said.

Included in Tuesday's session was a presentation by William R. Nelson, Jr., University of Illinois, entitled "Trees in the Landscape — A Look Beyond the Obvious." He dispelled old theories of touting trees for the shade they produce and their beauty. First consideration, he said, should be a return for dollar economic investment and their functional role in the environment.

Nelson's slide presentation demonstrated the development of space to a relative scale; larger trees relate to tall buildings and small trees and shrubs relate to man. Trees help identify a destination, indicate a change in traffic, define paths, alleviate monotony and eliminate the distressing feeling of broad open spaces with nothing to relate to, he said. Trees emit large amounts of water through transpiration thus cutting down on noise, cooling the air, producing oxygen, reducing the amount of dust particles in the air, controlling temperature, refracting light, and eliminating wind erosion and snow drifting, Nelson said.

Dr. G. N. Agrios, University of Massachusetts, pointed out the lack of available knowledge about viruses, their cause and spread. He explained that once a virus is introduced into a plant cell, the virus's nucleic acid agitates the plant and causes the plant to produce substances conducive to virus reproduction. Agrios listed the primary causes of virus spread as vegetative propagation, root grafts, insects, mice, nematodes, seed from infected

(continued on page 19)

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Arborist in the

HE'S THERE because people realize trees have value. A difference of opinion exists as to how much value the particular tree or trees actually have. In the careful, deliverate manner courts employ, all the facts are being examined. The arborist is to furnish an expert opinion, based on his thorough understanding of trees and the contribution they make to the value, beauty, usefulness and desirability of the property involved. His testimony will be used to arrive at a dollars and cents figure.

Most of us who have worked with trees, diligently learning daily all we can about them, obviously know more about trees than the average man-on-the-street. It isn't far amiss to say therefore, any one of us might find himself in the witness chair, should just the right set of circumstances arise. For that reason you may well visualize the arborist in the witness chair as being you.

A farm woodlot was being logged by an out-of-town firm. The logger, according to the owner of the woodlot, used destructive and wasteful methods, killing or damaging many desirable trees as he tried to gain access to the specific trees he wanted. An opinion was desired as to the value of the trees damaged and killed. In this instance a nurseryman who could furnish specific prices on specific sizes of trees was asked to list prices applicable as a basis for determining what it would cost to restore some of the value lost as a result of poor logging practice. There were many questions asked about how one would replant trees in a woodlot where terrain is steeply sloping, and what kinds and sizes of trees would be used. Emphasis was strictly on the practical; the esthetic values were ignored.

But the arborist-nurseryman was not the only expert whose opinion was sought. Information on soils and how logging practices would affect erosion came from an environmental biologist. He also showed how the change in the forest canopy would have an effect on the value of the woodlot. The point this illustrates is that no one person had all the information or answers needed.

In other cases the emphasis is on the esthetic value of a tree. Where a large tree casts its comforting shade on a house at just the right place, and during the warmest time of the day, it obviously would be difficult to replace that tree. Consider also the fact that the tree is simultaneously serving as an integral part of the home. It is a very real part of graciousness and beauty that characterizes the home; a part of what instantly appeals to the passerby or prospective buyer. The arborist will need to carefully avoid being carried away in poetic description, and yet be realistic enough to determine an actual dollar value, should the tree be condemned, damaged or destroyed.

Should you become that arborist in the witness chair, you need not fear a traumatic experience as inevitable. Nor should you think of it as a lark. In the role of expert witness you can do a great deal to help the public realize your professional status as an arborist. It is a place for your very best, most professional, performance. If one has kept up to date on all aspects of his daily activity with trees, then being an expert witness for a day in court can be an interesting addition to the sum of experiences that make a good arborist better.

Suppose an attorney asks you to be an expert witness, what can you do by way of preparation? You can get acquainted with the attorney, and talk with him — well before the trial date — on different aspects of the problem. Suggest questions he can ask you during the trial to further the case. Ask him to suggest appropriate clothes for the occasion, since he'll know the jury and how they might react to, say, a jacket that's a bit too sporty, or clothes that are too casual. Help him establish how well you are qualified as an expert by telling him all the facets of your background that could possibly be helpful. The professional organizations you belong to — and may have held office in — such as International Shade Tree Conference, National Arborists Association or American Society of Consulting Arborists (ASCA) are assets an attorney will quickly recognize. List all the ways you have continued your education in seminars and shortcourses, as well as your years of practical experience.

When the day comes for you to assume the witness chair it will help you to remember to be the courteous, confident professional in everything you do. When the varied and many questions are asked, answer simply, clearly, positively, and with integrity. If you're "cornered" with having to give a yes or **no** answer and you feel sure it can't be honestly answered that way, ask permission of the judge to give a qualified answer. If that is denied, then say you don't know. There's no advantage in going out on a limb to answer questions. More than likely you'll find the limb cut off behind you, so keep your answers simple and direct. Always answer honestly on your grounds. Remembering to be courteous can help when questions tend to be exasperating. Losing one's temper when in the witness chair may be human, but later it will be sorely regretted. As a witness you will be talking to the jury or the judge, so speak to them,

*The author is a member of American Society of Consulting Arborists. He also owns and operates Webster's Nursery in Waterloo, Iowa.

Witness Chair

By ARNOLD WEBSTER*

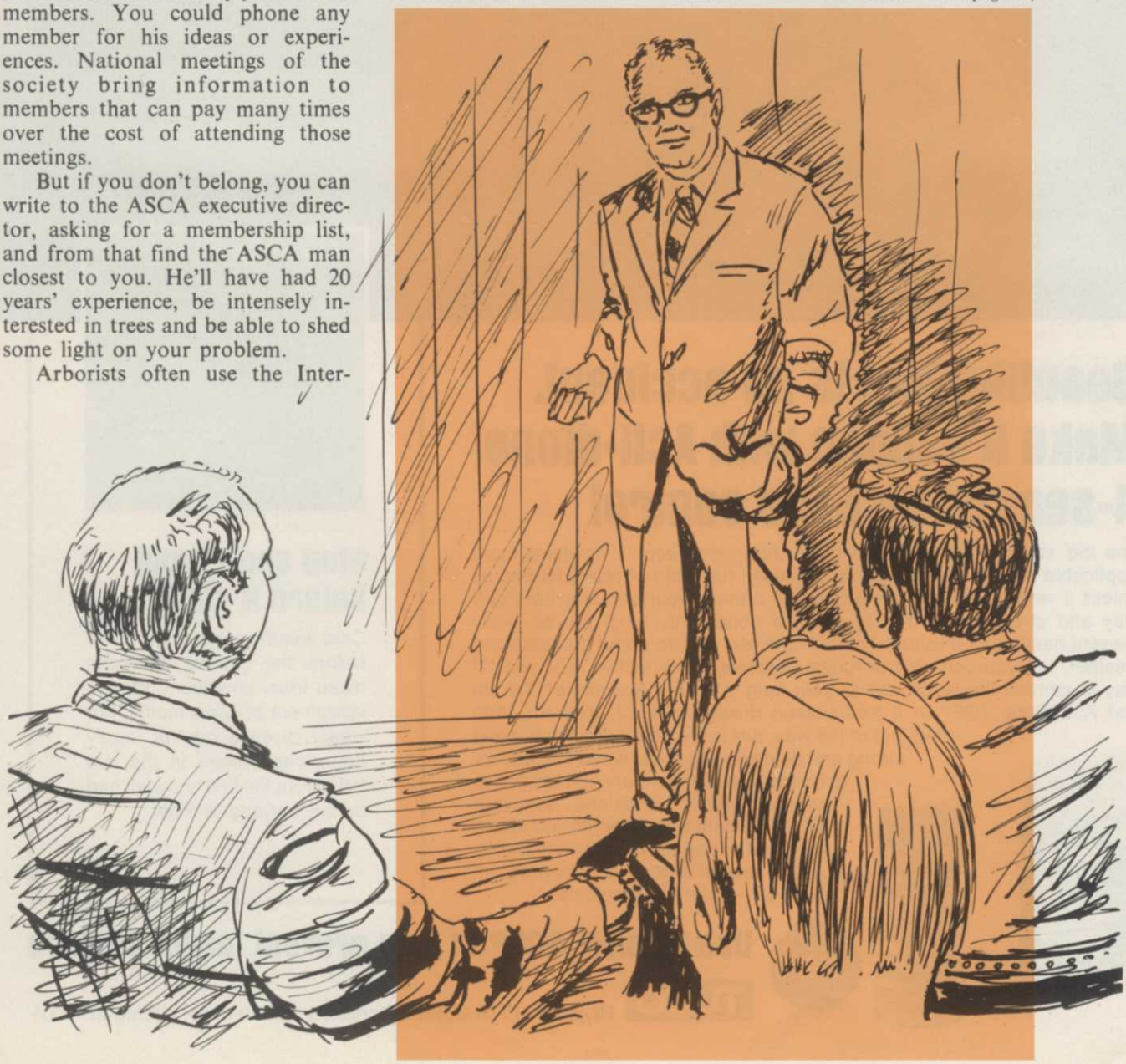
not the lawyers. Ask yourself: If I were a juror, what kind of a witness would I like?

You may wonder where a prospective witness can find help. If you were a member of the American Society of Consulting Arborists, you would have access to all case histories submitted (nation-wide) to the executive director by your fellow members. You could phone any member for his ideas or experiences. National meetings of the society bring information to members that can pay many times over the cost of attending those meetings.

But if you don't belong, you can write to the ASCA executive director, asking for a membership list, and from that find the ASCA man closest to you. He'll have had 20 years' experience, be intensely interested in trees and be able to shed some light on your problem.

Arborists often use the International Shade Tree Conference (ISTC) *Shade Tree Evaluation Manual.* The Internal Revenue Service (IRS) has at times demurred at values thus established, calling them contrived or unrealistic. ASCA has a committee actively working to establish a method of evaluation based on replacement costs, or a combination of tree cost from a nursery plus the cost of a tree mover's service. Interestingly, some nurserymen have found that the ISTC evaluation system comes close to achieving the same figures, especially when trees less than 12 inches diameter are involved. When a system of evaluation acceptable to IRS is devised, it will likely be uni

(continued on page 19)



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ISTC (from page 14)

plants and pollen. The best method of control is sanitation (removal of infected limbs and other host plants), he said.

Wednesday afternoon's educational session featured a three-member panel discussion on shade tree evaluation. Dr. L. C. Chadwick, executive director emeritus, presided. J. James Kielbaso, associate professor of forestry at Michigan State University, asked if hardiness zones and location should be made part of the ISTC shade tree evaluation formula. He defined hardiness zones as a key by nature that limits growth of certain species, usually by temperature.

Federal income tax laws are largely influenced by the fair market value of a tree, said Ray Gustin, Jr., Gustin Gardens, Gaithersburg, Md. He interpreted fair market value as the price which property will bring under no pressure to sell. One reason the Internal Revenue Service rejects the shade tree evaluation formula for determining the monetary value of a tree is its non-relation to the fair market value, he said. Gustin was also a member of Wednesday's shade tree evaluation panel discussion.

A slide presentation produced by Doyle Kincaid entitled "One Touch of Nature" highlighted Wednesday evening's activities. The presentation was originally designed for nature appreciation in school-age children, but many grade school teachers are finding Kincaid's slide show helpful in stimulating creativity in children.

Two more slide presentations — one describing Georgia's utility arboriculture program and another 18-minute presentation on the proper use of pesticides — were also shown.

Following the audio-visual program was an ISTC Pesticide Committee meeting. Hyland Johns, Asplundh Tree Expert Co., Willow Grove, Pa., said pesticide problems were national in scope but local in solution. He emphasized the need for the Green Industry to work together "for effective legislation action in our state houses." A lengthy question and answer period followed. Members of the committee included Leo Creed, Utility Arborists Assn.; Robert Felix, National Arborists Assn.; Dave Shaw, Municipal Arborists Assn.; and John Weidhaas, Virginia Polytechnic Institute, Blacksburg, Va.

Thursday's educational sessions were divided into four sections: utility arboriculture, municipal arboriculture, commercial arboriculture, and arboriculture research and education academy.

Robert Felix, National Arborists Assn., outlined a few basic business principles in a talk, "How to Manage an Arborist's Business." Felix discussed profit, selling the job, income for the job, personnel and wise planning.

Henry Pratt, B. G. Pratt Division, Gabriel Chemical, Paterson, N.J., said the popular environmental studies were causing most of the delays and problems in the classification and reclassification of pesticides. "Standards for pesticide classification will be met by the 1975 deadline but actual classification of specific chemicals will take longer than government officials have allowed," said Pratt.

Hyland Johns, taking a slightly different approach to new EPA regulations, suggested increasing awareness at the state level. Know your extension personnel, local pesticide applicators and be aware of changes made at state level, he said. Felix, Pratt and Johns made their presentation during the commercial arborists session on Thursday.

New president for ISTC is John Z. Duling, Duling Tree Expert, Inc., Muncie, Ind., vice president, Hyland Johns, Asplundh Tree Expert Co., Willow Grove, Pa., and president-elect is Jack R. Rogers, superintendent of Street Trees, City of Los Angeles, Pasadena, Calif. Total attendance for the meeting was 874. A special exhibit area in the Marriot Hotel featured the latest developments in tree care equipment, fertilizers and educational materials. Exhibitors were also given a chance to demonstrate their equipment at Stone Mountain State Park on Tuesday. There were 39 commerical exhibitors, 24 field exhibitors and 19 educational exhibits.

The all-delegate event at Stone Mountain State Park featured equipment demonstrations as well as a southern barbecue. There were 24 manufacturers represented at the outing. Delegates viewed the equipment in operation and were given the chance to operate nearly all the units.

WITNESS (from page 17)

versally accepted, a boon to the man in the witness chair and all of us. It would help present to the public a picture of an arborist profession whose members are not widely divergent in tree evaluations, but are both uniform and practical.

You may find additional help from foresters, biologists, entomologists, pathologists, landscape architects, nurserymen and others.

(continued on page 28)

Stanley presents the class of '74

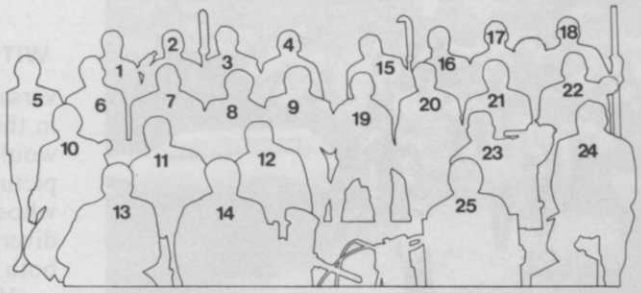

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Table 2: Growth reduction of an Oleander hedge sprayed on 7-10-73.

Treatment	Shoot growth cm			Height above old cut cm
	Days after treatment			
	74	84	111	84
1. 2% Alar + 0.1% X77	7.7ab[1]	10.7ab	25.9a	18.1a
2. 2%Alar + 1% Fomark foam	3.1bc	3.9bc	13.5bc	4.7b
3. 0.4% NIA 10656	0.6c	2.3bc	5.7bc	4.3b
4. 0.5% NIA 10656	0.5c	0.7c	4.7c	3.7b
5. Control	10.0a	16.1a	17.3b	24.9a

[1] Duncan's multiple range mean separation, 1% level, for each day period.

Table 3: Growth reductions of Oleander from varying application of 1% Alar in Jet X.

Treatment	Shoot growth cm			Plant height cm
	Days after treatment			
	30	56	77	77
1. 1% Alar + 0.25% X-77	18.9abc[1]	27.9bc	45.9ab	144.0abc
2. 1% Alar + 1% Jet X unexpanded	17.1bc	24.8bc	34.5bc	137.5bc
3. 1% Alar + 1% Jet X foam	16.1c	21.2c	27.9c	129.2c
4. 1%Jet unexpanded	23.8ab	39.0a	47.1ab	154.6abc
5. 1% Jet X foam	24.2ab	32.3ab	42.8ab	158.8a
6. Control	24.5a	38.2a	51.2a	156.4ab

[1] Duncan's multiple range mean separation, 1% level, for day period.

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FOAM OR SPRAY? *(from page 13)*

growth, it was not significantly different from the growth of the spray application with Alar plus Jet X. This growth reduction from Alar in foam persisted to the termination of the experiment four months after treatment. The Alar plus X-77 and Jet X alone, as spray or foam, did not cause a growth reduction as compared with the untreated plants.

Summary: Foaming agents were consistent in showing greater oleander growth retardation than Alar alone or Alar with the spray adjuvant X-77. Fomark, Jet X and Fomex were the most effective foaming agents tested with Alar. The foam generating pump was superior to aerating nozzles for a foam expansion of approximately 60:1 which gave a persistent foam.

The increased growth retardation of Alar in foams over Alar in unexpanded foaming agents which had been observed in greenhouse trials was not found for field applications. This difference was attributed to more variable, and frequently less desirable, climatic conditions in the field. The effectiveness of the unexpanded foaming agents could be due to a high surfactant concentration response.

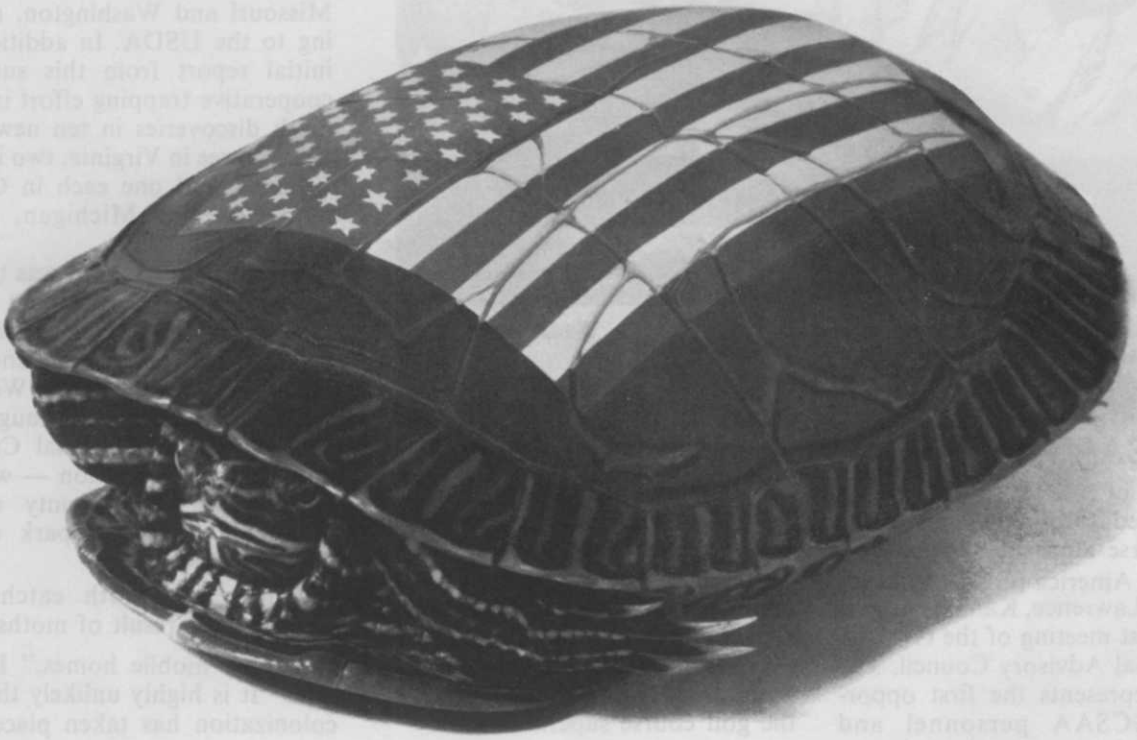
The growth inhibitor NIA 10656 treated plants showed a growth reduction for over 12 months from a single spray application of 0.3%.

Literature Cited

[1]Hield, Henry, 1972. California Agriculture 26(11):7.

[2]Horsfall, Frank, Jr., and R. C. Moore. 1962. Proc. Amer. Soc. Hort. Sci. 80:15-32.

The cooperation and chemicals furnished in these and other concurring experiments is gratefully acknowledged to: CalTrans, Riverside Plaza Shopping Center and The Braddock Co. for experiment locations; Uniroyal for the Alar; Colloidal Products Inc. for Fomex and Fomark foam; G. W. Rockwood for Rockwood and Jet X foam; The R.L.Wilson Co. for Foamspray; and the Waukeshau Foundry Co. for the use of a foam generator.



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industry news and newsmakers

GCSAA Educational Advisory Council (left to right): Younger, Ward, Turgeon, Hall, Estes, Daniel, Beard and Butler.

GCSAA Forms Educational Advisory Council

Eight of the nation's leading turfgrass educators gathered at the Golf Course Superintendents Association of America (GCSAA) headquarters, Lawrence, Kan., in August for the first meeting of the GCSAA Educational Advisory Council. The council represents the first opportunity GCSAA personnel and members of the academic community have had to assemble and consider all aspects of a golf course superintendent's educational needs.

Coordinating the activities of the council was GCSAA Director of Education Bill Knoop. Present for the meeting were: Dr. James Beard, Michigan State Univ., East Lansing; Dr. Jack Butler, Colorado State Univ., Ft. Collins; Dr. William Daniel, Purdue Univ., Lafayette, Ind.; Dr. George Estes, Univ. of New Hampshire, Durham; Dr. John Hall, Univ. of Maryland, College Park; Dr. Al Turgeon, Univ. Of Illinois, Urbana; Dr. Coleman Ward, Mississippi State Univ., State College; and Dr. Vic Younger, Univ. of California, Riverside. Unable to attend the meeting was Dr. Herbert Cole, Jr., Pennsylvania State Univ., University Park.

Representing the Association's elected executive committee was Director Richard Malpass, chairmanof the education committee and superintendent of Riverside Golf and Country Club, Portland, Ore.

During the two-day meeting, the council reviewed the educational program planned for the Association's International Conference in New Orleans (Feb. 16-21), the new pesticide applicator's seminar study manual and other educational materials. In addition, they discussed the overall GCSAA educational program and reviewed future needs of the golf course superintendent.

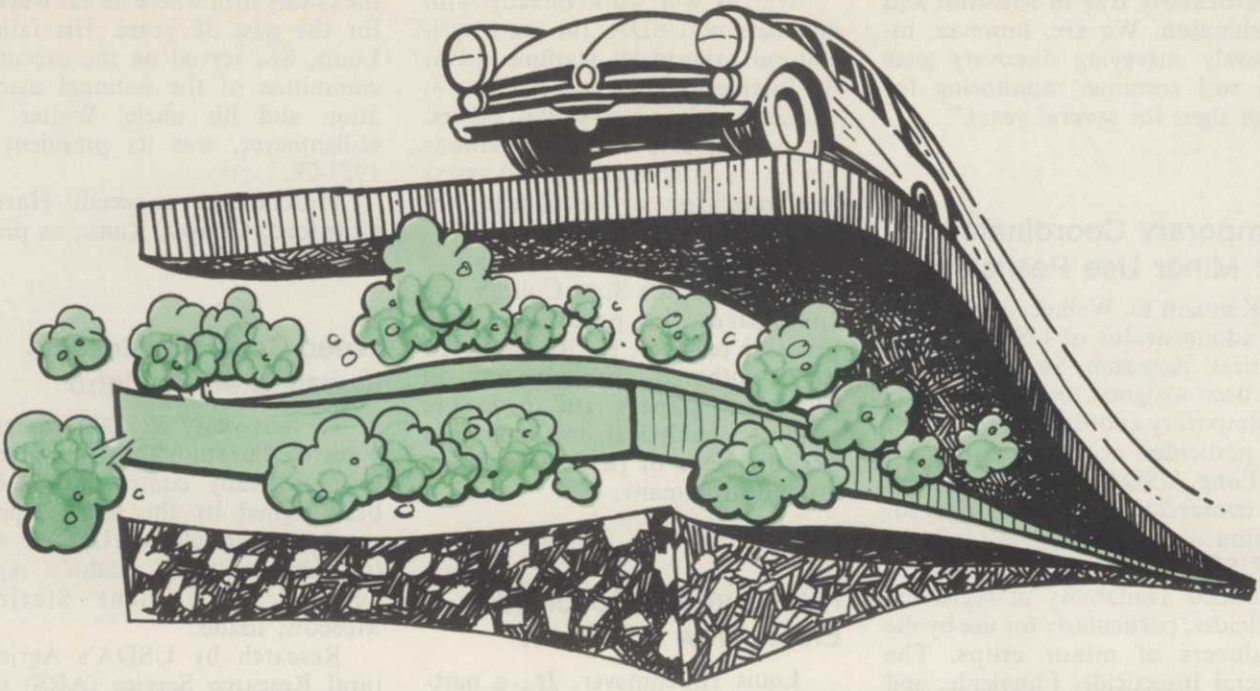
Gypsy Moths Found In Two New Locations

Gypsy moths have been discovered for the first time in parts of Missouri and Washington, according to the USDA. In addition, the initial report from this summer's cooperative trapping effort includes moth discoveries in ten new counties — three in Virginia, two in West Virginia, and one each in California, Georgia, Michigan, North Carolina and Ohio.

The Missouri moth was trapped in Green county, according to Leo G. K. Iverson, deputy administrator of USDA's Animal and Plant Health Inspection Service. Washington's first moth find — caught in a trap placed by National Campers and Hikers Association — was discovered in King county near a mobile home trailer park outside Seattle.

"The new moth catches are probably the result of moths hitchhiking on mobile homes," Iverson said. "It is highly unlikely that any colonization has taken place. This

Ford Tractor has selected the Jackson, Miss. Ford Tractor Company as the first of more than 200 dealers to receive a special "construction equipment" franchise. Ford is introducing a new line of four-wheel drive, articulated loaders and a new tracked, hydraulic excavator. Bert Head (center) displays the machinery to William S. Deviney, Sr. (left), president of Jackson Ford Tractor, and his son and partner, William Deviney, Jr.



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is particularly true in Missouri and Washington. We are, however, intensively surveying discovery sites and will continue monitoring for moth signs for several years."

Temporary Coordinator For Minor Use Pesticides

Kenneth C. Walker, assistant to the administrator of USDA's Agricultural Research Service (ARS), has been assigned the responsibility as temporary coordinator for minor use pesticides, according to Robert W. Long, USDA assistant secretary for conservation, research and education.

USDA is concerned with the continued availability of registered pesticides, particularly for use by the producers of minor crops. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA),as amended, makes it unlawful "to use any registered pesticide in a manner inconsistent with its labeling."

Under the 1972 FIFRA, all pesticide uses must be registered by the Environmental Protection Agency (EPA) by Oct. 21, 1976. Previously, the FIFRA controlled only interstate shipment of pesticides; it did not provide penalties for misuse.

Walker will work directly with members of USDA, the state agricultural experiment stations, EPA, the Interregional Project Number 4, the chemical industry and others. He will develop recommendations for future programs and will assess the need for a permanent coordinator.

Walker, a graduate in chemistry from Washington State College, has specialized in pesticides and pesticide residues. He has authored or co-authored approximately 50 scientific papers on pesticide residues, analytical methods and measurements of pesticide residues on and in humans.

Nurserymen's Association Elects New President

Louis Hillenmeyer, Jr., a partner in Hillenmeyer Nurseries, Lexington, Ky., was elected to the presidency of the American Association of Nurserymen, during its 99th annual convention held in Toronto, Ont.

Hillenmeyer comes from a line of nurserymen dating back to 1841 when the family business was established. After graduating from the University of Kentucky, he joined the family firm where he has worked for the past 38 years. His father, Louis, Sr., served on the executive committee of the national association and his uncle, Walter W. Hillenmeyer, was its president in 1927-28.

Hillenmeyer succeeds Harold Crawford, Ottawa, Kans., as president.

Weed Control by Insects Investigated in Idaho

A four-year, $25,000 research agreement to study the use of insects to biologically control weeds has been signed by the U.S. Department of Agriculture (USDA) and the University of Idaho's Agricultural Experiment Station, Moscow, Idaho.

Research by USDA's Agricultural Research Service (ARS) and Canadian entomologists revealed a number of foreign plant-feeding insects that attack specific types of problem-causing weeds. It is hoped that these insects can be used to control the weeds in this country.

Dr. Lawrence E. O'Keeffe, at the university, is the principal investigator and Dr. George R. Pesho, entomologist, is the ARS representative.

Some 800 people and two dozen commercial exhibitors were on hand for Ohio's Turf and Landscape Day held at the Ohio Agricultural Research and Development Center (OARDC) in Wooster, Ohio. In addition to lectures and demonstration/discussions, the day's program included wagon trips to OARDC's Secrest Arboretum. Educational exhibits, manned by research scientists and extension specialists, included problem clinics on insects, diseases and weeds.

Photo on left: P. O. Larsen, research plant pathologist, examines the control plot in fungicide evaluation trials for controlling dollarspot disease with F. O. Kanehl (right), owner of Spruce Tree Village, a mobile home park with a par 3 golf course, and Carl Still (center), Spruce Tree greenskeeper and park manager. ***Photo on right:*** G. C. Watson points out some of the many pine species which can be found growing in the Secrest Arboretum.

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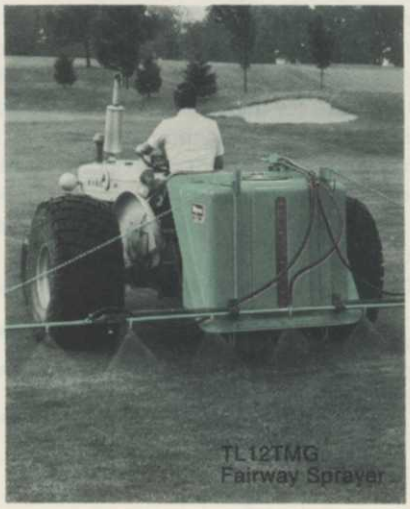
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WITNESS *(from page 19)*

It is certainly wiser to call in a specialist than to try to answer questions outside your field.

If being an expert witness sounds like something you could do, you've probably already asked this next question: How much would it pay me? The answer is as varied as the circumstances. Your attorney may want to establish that you and he have not previously discussed any pay. In that case you are dependent on the attorney. Some consultants have a base fee that is understood — often a written contract — when the job is undertaken. Certainly one should expect to be paid for time, research, travel and meals according to the exigencies of the day.

Though it should never be dismissed lightly, the witness chair is not necessarily a hot seat to be avoided. A competent professional arborist can be of genuine service to his community and a credit to his profession when serving as an expert witness. It behooves us all to become as thoroughly competent and well informed as possible in case we find ourselves the arborist in the witness chair.

Pest Management Degree Offered at UC Riverside

A new master of science degree program in pest management will be offered by the University of California, Riverside (UCR), beginning fall quarter, 1974.

Cooperating in the program will be members of UCR's entomology, nematology, plant pathology and plant sciences departments. Instruction will include theory, principles and practices of integrated control of pest organisms in the agricultural, urban and aquatic environments.

Prerequisites are a B.S. or B.A. degree in one of the biological or agricultural sciences or related fields. Course deficiencies can be corrected, according to Dr. Mack Dugger, dean of the College of Natural and Agricultural Sciences at UCR, if undergraduate or other previous studies have not included certain minimum requirements.

Dugger said the term "pest management" implies the use of various methods of pest reduction, compatible with and in combination with one another, with full awareness of pest and damage levels and of ecological considerations.

Pest management specialists are in short supply today, according to Dugger, and the outlook for employment in this field is bright. It recently has been estimated that some 11,000 jobs exist nationally for pest management specialists.

Wisconsin Marine, Inc. Appoints Distributors

Wisconsin Marine, Inc., manufacturer of the Bob-Cat line of lawn and snow removal equipment, announced the following distributor appointments: Farmers Supply & Equipment Ltd., Brampton, Ont., distributor in southern Ontario; Kaye Corporation, Mankato, Minn., distributor in Minnesota, North Dakota and western Wisconsin; The Ed Short Company, Seattle, Wash., distributor in Washington and Oregon; Lawn Equipment Corporation, Royal Oak, Mich., distributor in eastern Michigan; Olsen Distributing Company, Barrington, Ill., distributor in northern Illinois; and Ross Lawn Equipment Company, Tonawanda, N.Y., distributor in western New York.

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When you talk GRASS, you're really talking about a combination of several important characteristics.

Strong disease resistance. Aggressive root development. Good color. Excellent turf performance.

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The results speak for themselves. In 1962, a distinctively new Kentucky Bluegrass variety was developed through a special breeding project at Rutgers University. The name of the Bluegrass: Bonnieblue.

We recognized its potential and conducted further testing. In trials across the country over a 5-year period, Bonnieblue consistently ranked among the highest in overall turf quality.

It proved to maintain a rich dark green color over a long growing season. Showed good rhizome and tiller development. Low growth with excellent density. Best of all, an outstanding resistance to leaf spot, stripe smut, rust and snow mold.

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*Bonnieblue, Majestic, Sydsport and Birka Kentucky Bluegrasses and Koket Chewings Fescue.

For More Details Circle (103) on Reply Card

people on the move

Steven L. Flaherty, named assistant secretary of F. A. Bartlett Tree Expert Co. **Alton I. Walker,** appointed entomologist at Bartlett Research Laboratories in Charlotte, N.C.

* * *

Ron Picinini, named national accounts manager for Occidental Chemical Co.

* * *

Emilio (Leo) Bontempo, named vice president, planning and administration, for Ciba Geigy's agricultural division in Greensboro, N.C. **John A. Mullins, Jr.,** promoted to director of personnel and administrative services for the agricultural division.

* * *

Sierra Chemical Co. announces the following sales force expansion: **Gerald M. Curtice,** vice president, will coordinate European activities; **James W. Wilson,** advertising and sales promotion manager, will coordinate Pacific Basin expansion; **Richard Spies,** consumer products manager.

* * *

Irven B. Stacy III, appointed Swift Chemical Co.'s national brand manager of PAR EX Professional Products turfgrass line.

* * *

Carol Freedenthal, named president and chief executive officer of Kocide Chemical Corp.

* * *

Paris E. Glick, promoted to president of SSP Agricultural Equipment, Inc., a subsidiary of SSP Industries. **John Leifer,** named vice president-finance and director of SSP Industries.

* * *

John A. Manley and **Alfred J. Robinson,** appointed senior vice presidents, minerals and chemicals division, Engelhard Minerals and Chemicals Corp.

* * *

John W. Vance, named vice president of crop protection chemicals division, Agrico Chemical Co.; **Thomas J. Mulvihill, Jr.,** promoted to vice president of supply and distribution; **James R. Newlin,** elected corporate controller; **E. B. Graves,** named executive assistant to the president.

* * *

Roy F. Eldred, promoted to general manager of the parts division, The Toro Co. **Robert W. Gibson, Jr.,** succeeds Eldred as director of marketing for Canada, South and Central America and Asia in Toro's international division. **Richard J. Hargarten,** named director of material control and physical distribution for Toro.

* * *

Luis F. Figuerola, joined Thompson-Hayward Chemical Co. as regional director of field research and development for the north central states.

* * *

R. N. Hickerson, named special projects manager for phosphates and acids in the chemicals group of Olin Corp.

* * *

Desmond L. Farrell, assigned as assistant to the director, traffic department, Hercules, Inc. **Robert R. Stover,** named assistant general manager of the polymers department of Hercules.

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Remember the name because you're going to hear a lot about it. 0217® Brand Fylking Kentucky bluegrass lawn is something special. It forms a dense, thick turf, more disease and drought resistant. Greens up earlier, stays greener longer. Fylking can be cut low as ¾ inch, even ½ inch for home putting greens. Proven over many years of international certified testing. Ask your seed distributor for Fylking.

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Fylking selected as the World's Fair official grass.

Another fine product of Jacklin Seed Company

For More Details Circle (107) on Reply Card

ProTurf Hosts 90 Europeans

NINETY PROFESSIONAL turf managers and turf observers from Germany, Switzerland, Italy and the Netherlands stopped in central Ohio for three days near the end of summer to get a first-hand view of American life and to see the facilities of the ProTurf Division of O.M. Scott and Sons, Marysville, Ohio. The group, made up of golf course superintendents, sod growers, park and sports field managers, educators, editors and even a horticultural television show personality, was sponsored by Wolf-Gerate of Betzdorf, Germany, European distributor of Scott ProTurf products.

During the course of their central Ohio tour, the visitors saw a modern Volkswagen distributorship headquarters with its acres of beautiful landscaping; the Marysville high school football field sodded less than a month before last season's home opening game; the new golf course at Muirfield Village in Dublin, Ohio, designed by Jack Nicklaus and just opened for play last Memorial Day; The Ohio State University horticultural facilities; and the restored " German Village" section of Columbus where ProTurf's guests closed out one day of touring with dinner at an old-time German restaurant. The visitors also had an opportunity to tour Scott's extensive research and development facilities, and to examine and photograph acres of test plots. On the final day of the tour, they conducted and participated in a German-language seminar of their own on turf maintenance.

This tour marks the second occasion that European turf men and women have come in a group to visit Scott's ProTurf headquarters.

During their tour of the United States, 90 European turf managers visited research test plots at O. M. Scott and Sons in Marysville, Ohio. Here they are examining experimental grass varieties in the early stages of development.

One of the stops which interested the visiting European turf men was the test lawn laid over cement. Bill Hoopes (far right), Senior PTI Instructor of ProTurf, rolls back the sod to prove to the visitors that there is indeed cement under the living grass.

HANNAY REELS KEEP HOSE ON THE JOB

You can handle more hose, handle it faster, easier and with greater safety when you install Hannay reels on your spray equipment. Reel handling will keep your hose in service longer, too.

Choose your reels from the widest selection of sizes and rewind options for standard or high pressure service. They're all described in Catalog H-6612-ID. Send for your copy.

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For More Details Circle (124) on Reply Card

meeting dates

Oregon Park and Recreation Society, annual conference, Sun River, Ore., Oct. 13-15.

Southern California Turfgrass Council, 14th annual exposition, Orange County Fairgrounds, Costa Mesa, Calif., Oct. 23-24.

Central Plains Turfgrass Conference, K-State Union, Kansas State University, Manhattan, Kan., Oct. 23-25.

Sprinkler Irrigation Association, annual convention, Buena Vista, Fla., Oct. 27-30.

Turf and Landscape Irrigation Seminar, Northern California Turfgrass Council, Asilomar Conference Grounds, Pacific Grove, Calif., Nov. 8-10.

American Society of Agronomy, convention, Chicago, Ill., Nov. 10-15.

Tidewater Shade Tree Conference, Norfolk Botanical Gardens, Norfolk, Va., Nov. 12.

8th Annual Turfgrass Conference, Clemson University Cooperative Extension, Clemson, S.C., Nov. 12-13.

Nebraska Weed Control Conference, Scottsbluff, Neb., Nov. 12-14.

Metropolitan Shade Tree Conference, Lubber Run Recreation Center, Arlington, Va., Nov. 14.

Georgia Golf Course Superintendents Association, University of Georgia, 5th annual turfgrass short course, Nov. 24-26.

New Jersey Turfgrass Expo '74, educational conference and trade show, Sheraton Poste Inn, Cherry Hill, N.J., Dec. 2-5.

Midwest Association of Golf Course Superintendents, 22nd annual turf clinic, Medinah Country Club, Medinah, Ill., Dec. 3.

Ohio Turfgrass Conference and Show, Ohio State University, Columbus, Ohio, Dec. 3-5.

National Agricultural Aviation Association, convention/exposition, Las Vegas, Nev., Dec. 3-7.

Delaware Turfgrass Conference, John M. Clayton Hall, University of Delaware, Newark, Del., Dec. 9.

New England Chapter, ISTC, 11th annual meeting, Kings Grant Motor Inn, Danvers, Mass., Dec. 11-12.

Western Association of Nurserymen, trade show and 85th annual meeting, Plaza Inn, Kansas City, Mo., Jan. 5-7.

Tennessee Turfgrass Association, annual conference, Sheraton South Motor Inn, Nashville, Tenn., Jan. 6-7.

Penn-Del Chapter, ISTC, Marriott Motor Inn, Philadelphia, Pa., Jan. 8-9.

Kansas State Shade Tree Conference, K-State Union, Kansas State University, Manhattan, Kan., Jan. 9-10.

California Weed Conference, Sheraton Inn, Fresno, Calif., Jan. 20-22.

New Jersey Recreation and Park Association, 9th annual symposium, Labor Education Center, New Brunswick Campus, Rutgers University, Jan. 21.

For More Details Circle (112) on Reply Card

DeSalvo Elected President Of Pesticide Association

Henry DeSalvo, director of the Feed, Fertilizer and Pesticides Division of the Arkansas State Plant Board, was elected president of the American Association of Pesticide Control Officials at the annual meeting in Atlantic City, N.J., in August. The Pesticide Control Officials Association is international in scope with members from each of the 50 states, Canada and Puerto Rico.

The objectives of the Association are to promote uniform and effective legislation, definitions, rulings and enforcement of laws relating to the control of the sale, distribution and use of pesticides; to encourage and sponsor the adoption of the most effective and adequate method of analysis of pesticides; to develop high standards of pesticides inspection techniques and procedures; to promote adequate labeling and safe use of pesticides; to provide facilities and opportunities for free exchange of information, discussion and cooperative study of problems confronting members of the Association; and to cooperate with members of industry in order to promote the usefulness and effectiveness of pesticide products.

DeSalvo, who served the Association as president-elect the past year, succeeds M. R. Van Cleave of Iowa.

Indian Scientists to Study Insect Pest Pathogens

Research on entomology will be conducted by Indian scientists under a foreign currency grant awarded by the USDA.

Scientists at the G. B. Pant University of Agriculture, Pantnagar, will conduct a three-year survey for pathogens of insect pests. The long range objectives of this project are to isolate, identify and implement control of important insects. This project is part of USDA's continuing efforts to find safe and effective biological controls.

All foreign agricultural research done under the Special Foreign Currency Research Program is administered by USDA's Agricultural Research Service (ARS). This program, under the Food for Peace Act, provides for the effective use of U.S.-owned foreign currencies which cannot be converted into dollars, but which may be used for scientific research beneficial to U.S. agriculture and the American consumer. The grant will be paid for with Indian rupees available to the U.S.

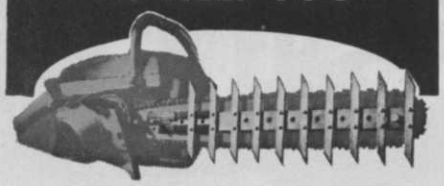
Dr. Arthur M. Heimpel, Beltsville, Md., is the ARS-cooperating scientist for this grant of 214,800 rupees (equivalent to $26,650).

Toro's Irrigation Classes Offered at Five Locations

For the first time since its creation in 1972, the "Irrigation Institute" of The Toro Company's Irrigation Division will offer tech-

(continued on page 41)

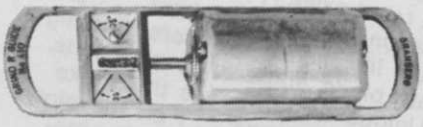
New Chain Saw Tools TO HELP YOU



Chain Saw Attachment

BRUSH, TREE, HEDGE & WEED TRIMMER

Attaches in seconds. Converts lightweight chain saw into powerful growth trimmer. For cutting brush and weeds, shaping and pruning trees, and trimming hedges. **Order as Clip-N-Trim,** sizes 12" to 21."



FREEHAND ELECTRIC CHAIN SAW SHARPENER

Manufactured with height plate and built-in angle marks. **22,000 rpm makes chain saw sharpening the fastest ever with precision. Order as Grind-R-Guide,** 2 models; **G-410, 110-volt; G-412, 12-volt,** powered by car or truck battery. Optional depth gauge attachment, **G-430.**

Shown are but two of a complete line of Granberg precision engineered yet inexpensive chain saw service tools & attachments. See them at your tool supplier or for additional information contact **GRANBERG INDUSTRIES, INC., 200 X So. Garrard Boulevard, Richmond, Ca. 94804.**

For More Details Circle (123) on Reply Card

ROSELLE

WOODBURY

Two Honored by Agricultural Chemicals Association

The board of directors of the Midwest Agricultural Chemicals Association has selected two outstanding contributors to the agricultural-chemical field in the U.S. to receive the Special Directors Award this year.

Robert E. Roselle, extension entomologist with the University of Nebraska in Lincoln, Neb., has been selected as one of the recipients. Roselle has been associated with the University of Nebraska since 1952. In the past, he has received the USDA Superior Service Award and is a charter member of the Backyard Farmer Panel on educational television.

The second recipient is Herbert A. Woodbury. Woodbury is one of the pioneers in the agricultural-chemical business and was a founder of the Woodbury Chemical Company. Woodbury was active in the company until 1969 when the Woodbury family sold their stock to farmland industries. He now travels and teaches for the United Nations, helping underdeveloped nations increase their food production.

The Exciting New
TURFTYPE
Fine Leaved Perennial Ryegrass

GAME VARIETY TURF TYPE PERENNIAL RYEGRASS

FINE LEAVED GRASS WITH MANY NEW OUTSTANDING FEATURES!

A NEW VARIETY of Perennial Ryegrass . . . GAME, was developed in the Netherlands by a leading grass seed breeder.

GAME was bred from a selection of flat growing plants. All the plants collected showing characteristics desirable for lawn use were tested over a three year period under a system of close mowing. Only those plants which survived this test and showed the best of other traits were used in breeding GAME.

UNDER THE highest quality controlled conditions available, GAME is now being grown in Oregon on a Certified Basis.

GAME is extremely drought resistant, and in comparison to other varieties continues to show its great quality under dry conditions.

GAME has extremely high regrowth characteristics. It readily survives close mowing and hard wear.

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For More Details Circle (121) on Reply Card

Infrared Aerial Photography — Easier Than You Think!

By W. E. Wildman and J. K. Clark

William Wildman (pilot) is soils specialist and Jack Clark (with camera) is photographer with the University of California Cooperative Extension at Davis. Wildman became interested in aerial photography several years ago, taking his own pictures while piloting the plane. In 1973, he teamed up with Clark to assess the value of low cost infrared aerial photography as a management tool. They have taken over 9000 paired color and infrared slides of a variety of crops and landscapes throughout California.

YOU'VE HEARD of infrared. Maybe you don't know quite what it means, but you've seen some curiously beautiful pictures with shades of red where green plants ought to be. You've heard that it's a new kind of photography that promises to discover plant diseases and other problems before you can see them with your eyes. Let's look at this interesting new tool, see in simple terms how it differs from ordinary photography and find out how it may be useful to us.

First, what is infrared, anyway? Briefly, infrared is a part of the broad energy spectrum which starts at the short wavelength end with cosmic rays, gamma rays and X-rays. A little way up the wavelength line comes ultraviolet radiation, then with increasing wavelength, visible light, infrared, microwave and finally the long radio waves. Scientists don't yet understand all they know about this electromagnetic spectrum, but that doesn't stop it from being enormously useful to us in many ways.

Visible light covers only a small part of the total energy band. Infrared covers a much broader portion, and herein arises a source of some confusion. A large part of the infrared band, the so-called "thermal infrared," is the result of heat emitted from objects. Infrared color or black and white films do not record thermal infrared, but are sensitive to the "near infrared" radiation which is reflected from objects. The near infrared reflectance is not a function of the temperature of the object. If it were, green plants would be the warmest things in the picture, and we know this is not the case. Some people prefer to call this radiation "photographic infrared." If our eyes were sensitive to it, we might see it as an additional color.

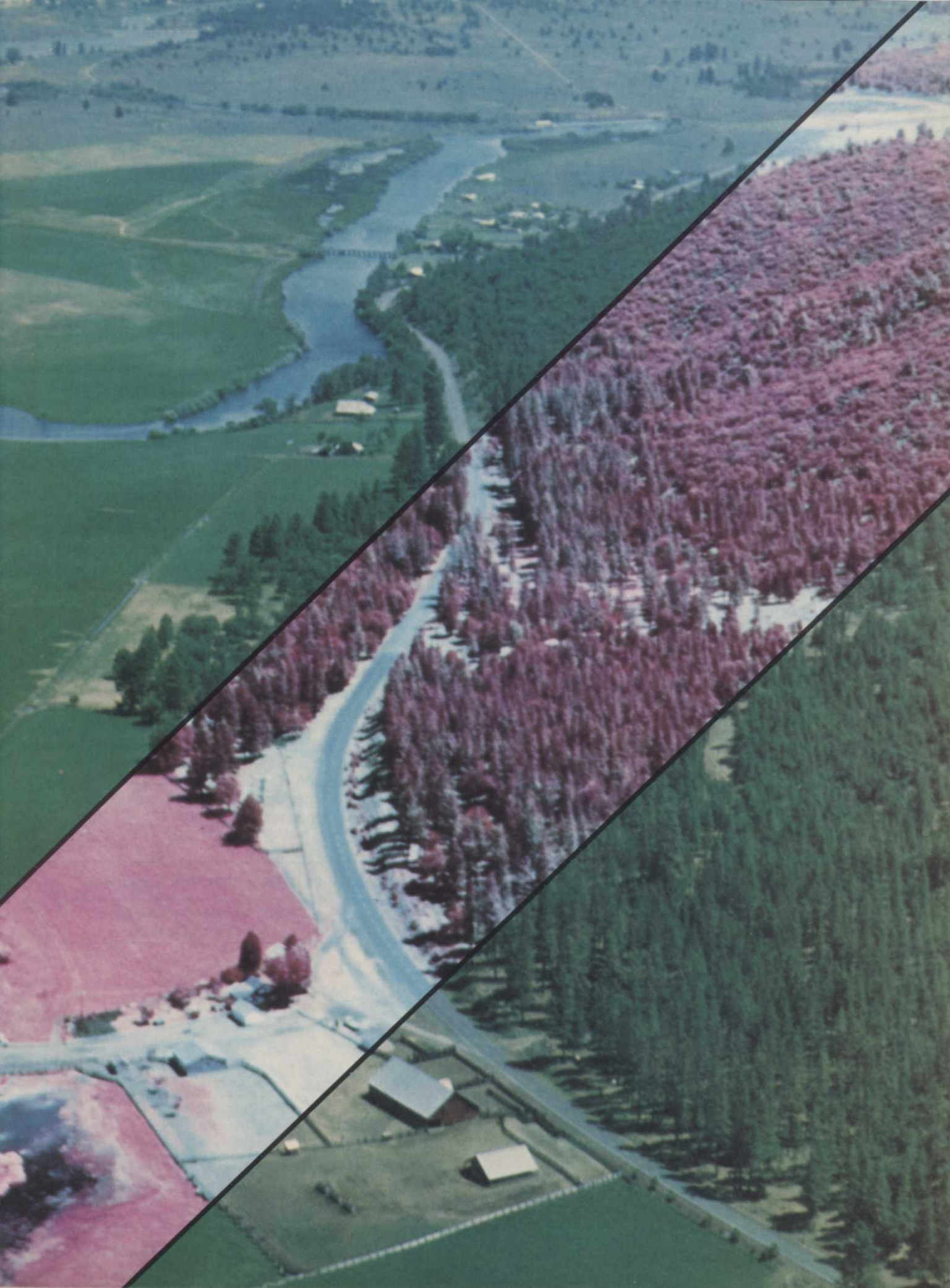
To understand the similarities and differences between ordinary color film and infrared color film, imagine a color picture of a girl resting on a hillside. Ordinary color film is sensitive to the complete visible spectrum and contains three layers sensitive to blue, green and red light. Dyes formed in these layers during processing produce a true color image. Visualize the various colors in the picture — green grass, blue sky, the girl is holding a red flower and wearing a blue cap.

If you were to look at an infrared color picture of the same scene, the most striking difference would be that the green grass is now red. You would also notice that the red flower is now yellow, and the blue cap is red. This is called a false color image. The film is recording only part of the visible light spectrum, the green and red bands, and is also sensitive to the near infrared portion of the spectrum. This film uses the same dye colors as ordinary color film but the dyes are developed by different wavelengths than they are in color film. Hence, false colors result in the final picture, and there is a purpose in this.

Healthy green plants reflect, in addition to green light, large amounts of near infrared radiation. Nothing else in the landscape reflects this combination of radiation. The false color assignment of dyes to sensitive layers of infrared color film results in green plants appearing in various shades of red.

(continued on page 44)

Right: This composite picture, made from ordinary color and infrared color slides, is the companion picture to the cover. Notice that the pine trees with a fungus disease are more easily detected in the infrared portion of the photo.



Profile of an Industry

By JOHN R. HALL, University of Maryland
and
GEORGE B. ROCHE, Marketing Specialist, Maryland Department of Agriculture

A SURVEY was conducted by the University of Maryland, Department of Agronomy, and the Division of Marketing of the Maryland Department of Agriculture in December 1973 to determine the market availability of sod in Maryland. Over 80 sod farmers in the state participated in the survey making it the most recent comprehensive acreage survey of the Maryland sod industry. The results of this survey are of value to sod producers as they attempt to anticipate supply-demand pressures and make plans for production and marketing. In the presence of high interest rates and continuing sewer moratoriums, the need to make professional marketing decisions is of utmost importance.

Table 1: Total Sod Production Acreage in Counties of the State of Maryland.

County	% of Maryland's Acres	Total Sod Acreage
Caroline	868	6.6
Carroll	1730	13.1
Cecil	480	3.6
Charles	158	1.2
Frederick	195	1.5
Harford	1587	12.1
Howard	1593	12.1
Montgomery	4958	37.6
Prince George's	605	4.6
Queen Annes	749	5.7
Other Counties*	227	1.7

*Allegheny, Anne Arundel, Dorchester, Kent & Worcester County Combined Acreage

In December of 1973, Maryland sod producers indicated that 5,699 acres of sod would be ready for sale in 1974, 5,555 acres would be in intermediate stages of maturation and 1,896 acres of sod were yet to be planted. This survey indicated that Maryland's total acreage committed to production of cultivated sod for 1974 was approximately 13,150 acres.

Fifteen of Maryland's 23 counties have acreage in sod production. Montgomery, Carroll, Howard and Harford counties are the leaders in sod production with 37.6%, 13.1%, 12.1% and 12.1% respectively (Table 1).

There are many types of sod available to the sod buyer in Maryland including warm-season and cool-season grasses, single varieties, mixtures and blends. The greatest amount of sod produced in Maryland is a mixture of 40% improved Kentucky bluegrass, 40% South Dakota Certified Kentucky bluegrass and 20% Pennlawn red fescue (Table 2). The majority of the acreage is in the Maryland Department of Agriculture Certification Program.

Performance observations made throughout the state indicate that the 30-30-30-10 blends (30% Merion Kentucky bluegrass-30% Improved Kentucky bluegrass-30% Common Kentucky Bluegrass-10% Creeping Red Fescue) are performing well and rapidly rising in consumer and producer desirability.

(continued on next page)

Table 2: Sod Available in Maryland in 1974 by Type and % of Maryland's Salable 1974 Sod Acreage.

Type of Sod	% of Maryland's Salable 1974 Sod Acreage
Single Varieties	
Kentucky bluegrass	9.7
Bentgrass	0.1
Bermudagrass	0.5
Tall Fescue	0.9
Zoysia	0.3
Sub-Total	11.5
Mixes	
40%-40%-20% (K. Blue-K. Blue-Creeping Red Fescue)	41.3
30%-30%-30%-10% (K. Blue-K. Blue-K. Blue-Creeping Red Fescue)	20.4
90%-10% (K-31 Tall Fescue-K. Blue)	9.9
Sub-Total	71.6
Other Mixes	7.9
Straight Bluegrass Blends	9.1

green industry

did you know?

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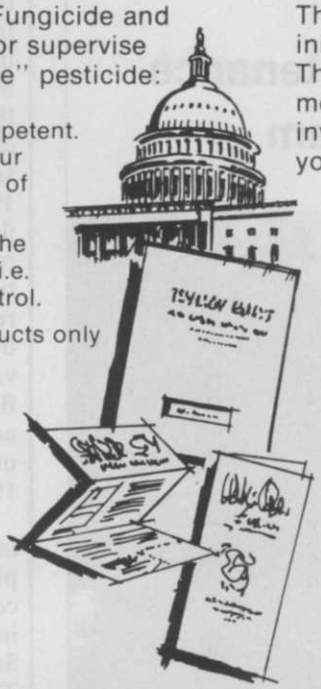
- You must be certified as competent. Can you pass an exam on your knowledge of the proper use of "restricted use" pesticides?
- You will be examined under the category of work performed. i.e. ornamental and turf pest control.
- You must use pesticide products only as labelled.



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I would like to subscribe to NPCA's Outdoor Pest Services program. understand that this does not entitle me to NPCA membership and that I cannot display the NPCA logo. All NPCA materials and manuals other than outdoor pest services will be available at non-member rates. Enclosed is my check for $95.00.

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**Structural pest control companies which are not members of NPCA, which do outdoor pest work are not eligible for this program unless they join NPCA as regular members.

For More Details Circle (144) on Reply Card

The Royer Chipper.

It uses a new design concept

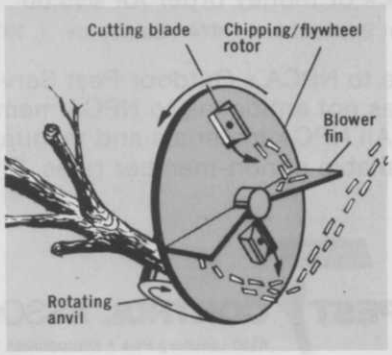
- **to reduce chipper cost**
- **to reduce chipper maintenance**
- **to reduce chipper scream**

Royer's new "2600" Series Chippers are designed to be a lot easier on your budget and your ears. They provide an exceptionally fast, low-cost way to convert brush, branches, trimmings and stalks into chips. And, they're specifically designed to meet the needs of small commercial applications . . . are available in both PTO (three-point-hitch for tractor operation) and self-powered models.

The new chippers feature a design that combines a *rotating anvil** with a heavy-duty chipping rotor that also serves as a blower and flywheel. A unique design that delivers high-output, low-maintenance operation. And quieter operation, too. With a lot less "chipper scream" — because of an operating principle that cuts way down on rotor rpm's without cutting down on output.

We believe you'll like everything about our new chippers. Their performance. Their lower cost. Their quieter sound. You can get complete details by requesting literature.

**Patent pending*



Here's how it works: As material is placed in the deep-throated hopper, the rotating anvil self-feeds the material to a high-speed chipping rotor. Steel blades, projecting through slots in the rotor, then slice the material into chips for immediate discharge by the integral blower. Very simple, but very different from other chippers.

ROYER

ROYER FOUNDRY & MACHINE CO.
186 Pringle St., Kingston, Pa. 18704

PROFILE *(from page 36)*

The addition of the third variety of Kentucky bluegrass appears to add increased disease resistance and greater multi-season performance potential to this sod mixture.

The agricultural economic impact of the Maryland sod industry continues to increase (Table 3). Neither Maryland nor the USDA tabulate annually the cash receipts from sod production. However, figures were computed using 1971 Maryland State Board of Agriculture estimates.[1] The average value of an acre of sod sold on a cash first sale basis ($1,205), coupled with 1972 estimates of sod acreage sold, illustrates that the sod industry represents an important agricultural product in Maryland on a cash receipt basis. This value for sod production is most likely a conservative estimate as the sod value figures were for 1971 and the acreage figure represented only 75% of the acreage available for sale in 1972.

The 13,150 acres of sod currently in production in Maryland multiplied by the 1971 average installed cost of $3279 per acre[1], illustrates an increase of the Maryland Gross State Product of 43 million dollars. These tangible effects of the sod industry upon the agricultural economy of the State of Maryland are important, but perhaps not as important as the intangible effect of quality sod upon the health, happiness and well-being of Marylanders.

Without question, sod ranks as the most effective soil erosion deterrent. Its dollar value, both as a contributor to soil conservation and to air quality, is beyond measure.

References

[1]Miller, William R., 1972, The Commercial Sod Industry in Maryland 1971, Publication No. 55, Maryland State Board of Agriculture, July 1972, 6pp.

[2]Bookout, Byron R., 1974 Maryland Agriculture Statistics — Annual Summary for 1973, Maryland Crop Reporting Service, Publication 11, June 1974, 68 pp.

Table 3: 1972 Crop Cash Receipts on a Cash First Sale Basis From Farming in Maryland.[1 2]

Crop	1971	1972
Corn	28,039,000	$34,561,000
Tobacco	23,123,000	$23,081,000
Soybeans	19,014,000	$22,070,000
SOD	3,672,000	$ 5,440,000
Wheat	5,005,000	4,379,000
Apples	3,953,000	3,696,000
Snap Beans	2,013,000	2,805,000

For More Details Circle (129) on Reply Card

insect report

Information from USDA Cooperative Economic Insect Report dated September 20, 1974

TURF INSECTS

SOD WEBWORM

(Crambus trisectus)

MARYLAND: Larvae heavily damaged 15 acres of bluegrass sod near Olney, Montgomery County, averaged 5 per square foot. MICHIGAN: Adult flights numerous in central area, particularly in lush grass. No controls suggested this year. Sod should be assessed for damage in spring 1975 and appropriate action taken if necessary.

BENEFICIAL INSECTS

DILARID

(Nallachius americanus)

KENTUCKY: Adult male collected in blacklight trap near Anton, Hopkins County. This is a new county record. Larvae of this neuropteron are predaceous.

SCOLIID WASP

(Scolia dubia)

MARYLAND: Adults active in several areas of Prince Georges and Charles Counties over past 21 days. Heaviest counts ranged 50-250 per acre. Activity appears above normal this season.

TREE INSECTS

BALSAM WOOLLY APHID

(Adelges piceae)

OREGON: Collected on subalpine fir *(Abies lasiocarpa)* at head of Tiger Creek in Umatilla National Forest, Umatilla County. This is a new County record and significant extension of range as this aphid only previously known from west side of Cascade Range in State. Survey underway to determine extent of infestation in Blue Mountains.

ASIATIC OAK WEEVIL

(Cyrtepistomus castaneus)

WEST VIRGINIA: Adults collected on pin oak in Greenbrier County near White Sulphur Springs. Adults collected on white oak at Wheeling, Ohio County. These are new county records.

COTTONWOOD LEAF BEETLE

(Chrysomela scripta)

NEW MEXICO: Light to heavy activity noted on *Populus* spp. and *Salix* spp. near Los Lunas, Valencia County, and Albuquerque, Bernalillo County. One row of cottonwoods in Albuquerque area severely damaged. All stages of insect currently active.

FALL WEBWORM

(Hyphantria cunea)

MISSOURI: Nearly full-grown larvae ranged light to moderate throughout central and southern areas. Webs observed on persimmon, wild plum, walnut, pecan, and many other trees.

ARBORVITAE LEAFMINER

(Argyresthia thuiella)

MICHIGAN: Severe damage to cedar and arborvitae noted in many northern counties. Trees brown and foliage dropped as result of larval leafmining. Valuable specimens may be protected in 1975 with chemical spray. Little can be done to limit populations under forested situations.

VARIABLE OAKLEAF CATERPILLAR

(Heterocampa manteo)

MICHIGAN: Larval development delayed about 14 days due to unseasonably cool weather. Parasitism averaged 74 percent, will greatly reduce population.

ORANGESTRIPED OAKWORM

(Anisota senatoria)

MARYLAND: Heavy outbreak noted on various oak species planted along highways and U. S. Interstate highway 70-S in Montgomery County. Many trees completely defoliated.

WALKINGSTICK

(Diapheromera femorata)

OKLAHOMA: Light numbers taken from blackjack oak 7 miles north of Sallisaw, Sequoyah County. This is a new county record.

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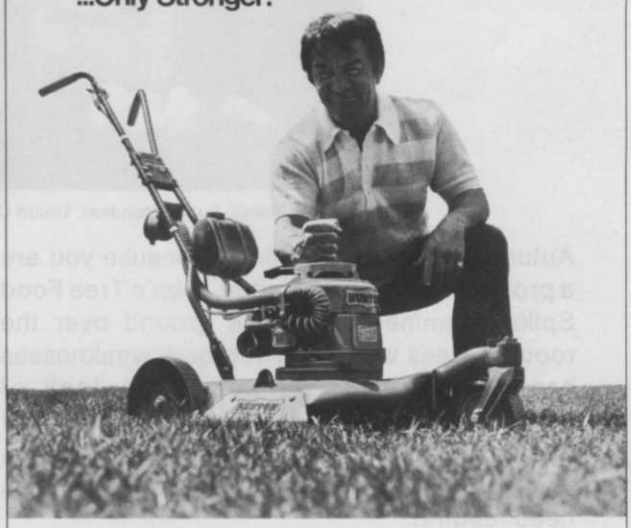

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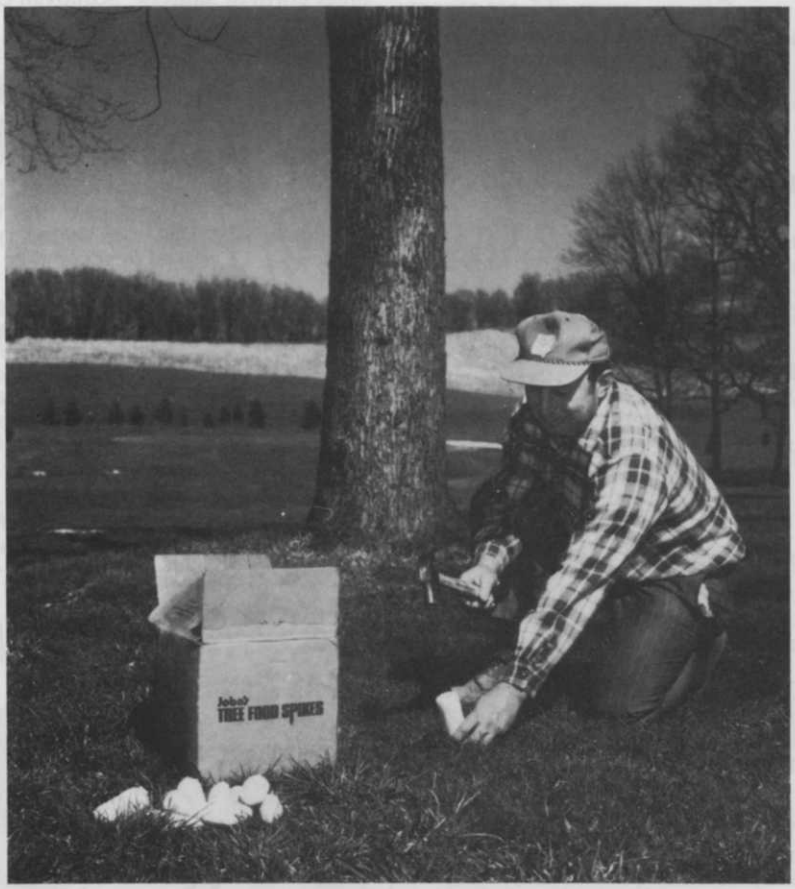

William Kobel, Superintendent, Union Country Club, Dover — New Philadelphia, Ohio

Autumn is tree feeding time. Because you are a professional, you know that Jobe's Tree Food Spikes hammered into the ground over the roots of trees will help overcome weaknesses brought about by summer heat, lack of moisture, ravages of insects, battering of winds. Especially this fall, when drought has prevailed over much of the country, trees need feeding.

Jobe's Tree Food Spikes will stimulate new root growth right up until the ground is frozen solid. As the root system develops this fall, it gives trees as well as shrubs the stamina to survive winds, rain, sleet, freeze and thaws of winter. Feeding this fall also gives the tree an earlier start next spring since a reservoir of plant food is provided.

Fertilize the trees you're responsible for with Jobe's Tree Food Spikes. Call your local jobber or distributor or order direct: 5 cases @ $30 per case, 15 cases @ $25 per case, freight prepaid.

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TORO *(from page 32)*

nical training programs "in the field" in all five of the company's marketing regions.

Previously, all training programs were conducted at the Division's Riverside, Calif., headquarters.

Other changes in the 1974-75 class schedule include elimination of tuition charges. All field courses will be for residential and commercial irrigation contractors. Special courses will be offered in California for landscape architects and college and university instructors.

Bruce C. Camenga, manager of field technical training for Toro Irrigation, said the courses have been designed for contractors whose business is expanding and who need technical assistance in training new personnel, as well as for contractors new to the irrigation business.

For more information on the Irrigation Institute, write to Camenga at: Irrigation Division, The Toro Company, 5825 Jasmine Street, Riverside, Calif., 92504

Ciba-Geigy Move Announced

The northeast region sales office of Ciba-Geigy Corporation's Agricultural Division has relocated from Newtown, Conn., to Washington, Pa., a suburb of Pittsburgh.

Northeast regional sales manager Keith Brum said the new office is nearer the center of the Division's northeast sales and research regions. He said the Pittsburgh area offers better access to a full service airport and interstate highway systems, faster mail service and improved office facilities.

Lawn Maker Names Sales Rep

Environmental Turf Management (ETM) of Chantilly, Va., has been named by Lawn Maker Inc. as exclusive sales representative for the Virginia and Maryland areas.

Headed by Dennis Ivey, ETM will be responsible for sales of the Lawn Maker multi-function turf care combine, in addition to the training of purchasers in the operation of the equipment.

Ivey will be conducting training sessions throughout the winter for users who will be entering the field of automated lawn care service for the first time. The company provides complete training and other assistance to purchasers of its equipment.

Research Contract Granted For Pesticide Analysis

The EPA has awarued a $182,536 research contract to the Battelle Memorial Institute, Columbus, Ohio, for a study of the toxic impurities of pesticide compounds.

The contract calls for a two-phase investigation of six pesticide compounds: Endosulfan (thiodan), Trifluralin, Furadan, Atrazine, Ferban and PCNB.

Phase I will involve an evaluation of their commercial synthesis routes, including solvents, additives and all starting materials. In phase II, the six compounds will be subjected to detailed analysis, including the use of a variety of analytical techniques to assist in unequivocally identifying the impurity compounds. All impurity compounds which are present in concentrations of 0.05 percent or greater will be reported.

The two-year study is being funded by EPA's National Environmental Research Center in Research Triangle Park, N.C. The work is part of the Center's continuing program to develop analytical methods for pesticidal compounds.

Announcing the new Asplundh "Whisper Chipper"

Looks the same—sounds so different!

This new unit has all the dependable features of our famous chipper line. However, there is a remarkable difference — a great reduction in noise. Modification kits will be available for many existing models. **Asplundh Chipper Company, a division of Asplundh Tree Expert Co., 50 E. Hamilton Street, Chalfont, Pa. 18914**

ASPLUNDH

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BRUSH DISPOSAL — PROBLEM TO PROFIT

ANTI-POLLUTION LEGISLATION restricting burning has had a positive effect for the maintenance section of the Ohio Department of Transportation, as it has for many other states. What looked like a real brush disposal problem after EPA regulations went into effect has proven beneficial for the department.

"Instead of having to haul cut brush and tree limbs in loose, bulky loads to a landfill site or a burning station," said O. Carson Barklow, "we use Wayne Brush Chippers." Barklow is Assistant Deputy Director of Operations and Maintenance for Ohio's Department of Transportation.

The department is divided into 12 districts. This past year each district purchased a Wayne Brush Chipper for maintaining highway rights of way, and to dispose of nuisance brush and low overhanging tree limbs thus improving vehicular clearance and sight distance for safer driving. A positive side benefit in the use of chippers is the creation of mulch now used on the roadside. Using a standard five-cubic-yard dump truck, which spreads salt in winter months, chipper chutes are adjusted to throw chips directly into the truck and they are then taken to a stockpile area.

Each crew can fill as many as three truckloads of chips a day. Chips are allowed to decompose for several months and are used extensively in the state highway landscaping program. In some instances, the chips are directly distributed by the chipper back onto the soil to cover bare spots where seed hasn't taken, or in natural wooded areas.

Ohio's Department of Transportation has found brush disposal with Wayne Brush Chippers to have many beneficial side effects.

After chips are spread, fertilizer is broadcast over the top and the area is seeded.

"The wood chips provide an excellent base for new growth," said Barklow, "and the mulch also helps prevent erosion by retaining the soil. One advantage of this system is that unlike straw, chips are more dense and don't blow away as readily."

The Department of Transportation maintains 16,000 miles of rural, state and federal highways throughout Ohio's 88 counties.

"Increased productivity of brush chippers has opened up a new phase of tree and brush disposal for the department," Barklow said. "The chippers have plenty of power and their safety features are an important factor with the extensive work load of our department." In addition to using their Wayne Chippers for highway clearance, the department also uses them in roadside rest area maintenance, providing safer, more esthetic rest areas for the traveling public.

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For example, 200 acres of grassed median in Pennsylvania were treated with MAINTAIN early last spring, just after the first mowing. The grass was cut once more before Labor Day, and that was it. MAINTAIN saved the State Department of Transportation approximately 5 mowings that year.

What's more, MAINTAIN works on trees, shrubs and vines as well as grasses.

While it slows down the growth of turf, it practically stops broadleaf weeds in their tracks. Which, naturally improves the quality of the turf, as well as the effectiveness of your maintenance program.

And MAINTAIN can be sprayed where machinery can't go. Up steep slopes. Around guard rails. Along fences.

At Washington National Airport in Washington, D.C., MAINTAIN was used on a dangerously steep bank between two levels of the airport. MAINTAIN saved the maintenance department 5 mowings, and the chance of injuries was reduced immeasurably because the equipment was not used as often.

Of course, the best way to find out what MAINTAIN can do for you is to try it. And the best way to do that is to get in touch with your U.S. Borax distributor or your nearest U.S. Borax office:

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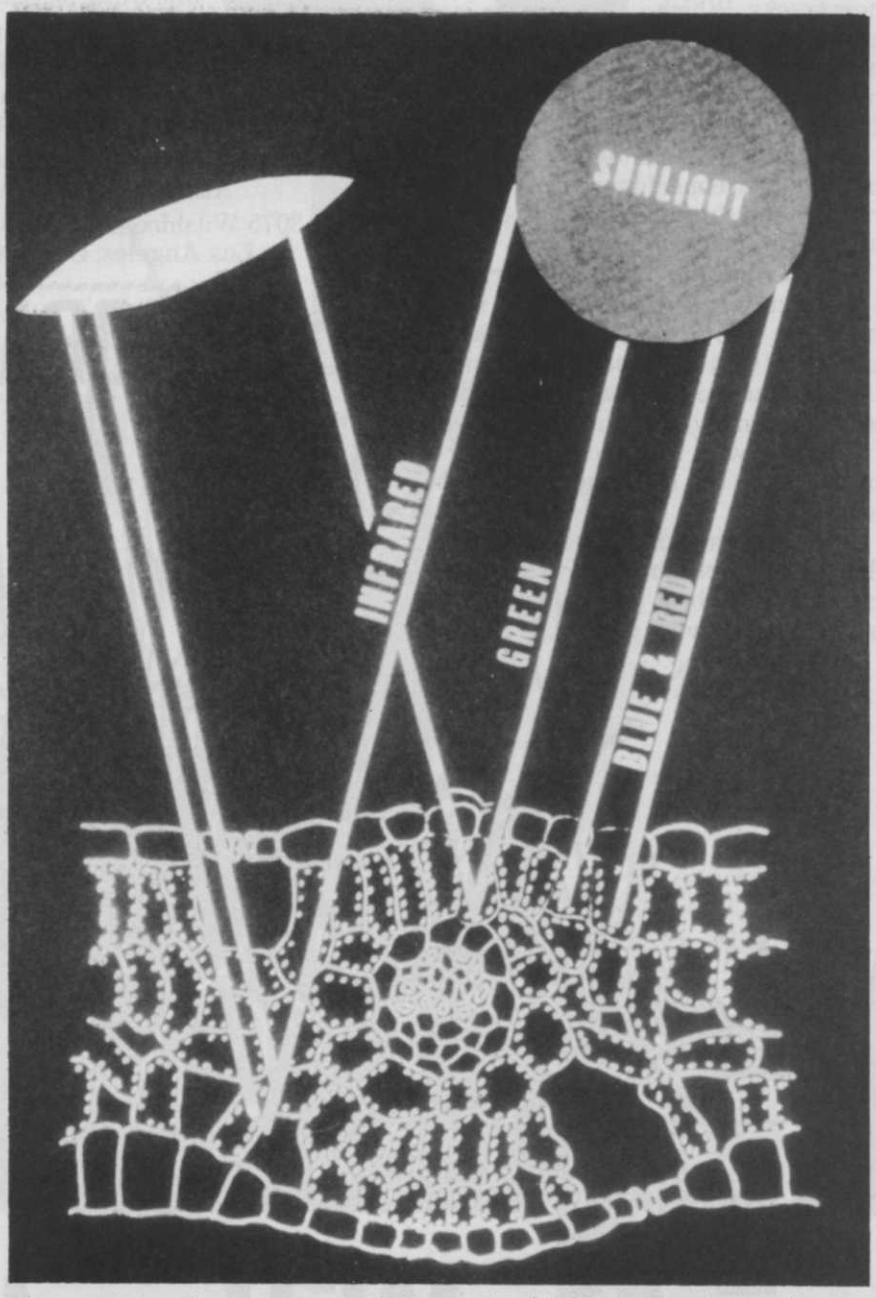
INFRARED *(from page 35)*

Naturally-red objects appear yellow or green. Green objects which are not plants do not reflect much infrared, therefore show in the final picture as purple. This effect enabled aerial photographers in the Korean War to detect camouflage which was painted green, and was the original reason for the development of infrared color film.

How can infrared color photography be useful to us? Anyone who deals with plant growth has a potential use for infrared color photography. Since plants reflect large amounts of invisible near infrared radiation, recording it on film may give us information about plant response that we cannot see with our eyes.

For example, consider the visible light and infrared radiation that comes from the sun and falls upon a green leaf. The blue and red wavelengths are largely absorbed by the chlorophyll in the leaf and provide the energy for photosynthesis. Green light is partially reflected and we see plants as a green color. Infrared is reflected from deeper in the leaf tissue, and in greater amounts than green light. Any disease or stress on the leaf tissue may cut down on the amount of infrared reflected, without changing the amount of green light reflected. When this happens, we may be able to spot an adverse condition by taking an infrared photograph before we can see the symptoms with our naked eye. This is called *previsual detection.*



When sunlight strikes a green leaf, blue and red light are absorbed and used in photosynthesis. Green light is reflected, giving plants a green color. Infrared is even more strongly reflected than green, but we cannot see it.

Can infrared photography be useful in everyday agricultural and environmental management? We set out to answer this question in the summer of 1973. Although a number of research studies have pointed out various specialized uses of infrared aerial photography, we knew of no one doing it commercially except on a high-priced, special project basis. We reasoned that if relatively inexpensive aircraft and hand-held 35 mm cameras could be used, the cost of aerial photography might be lowered to the point at which it could become a routine management tool.

To find out, we made monthly flights from April to October over the state of California in a rented Cessna 172. We asked county extension agents and university researchers to submit requests for aerial photos of crops or land uses of their interest. Our photographer made a simple frame on which he mounted two 35 mm cameras. Using a double cable release, both cameras could be snapped simultaneously to obtain matching color and infrared color photos of an object. At the end of the season we had accumulated 3,000 pairs of color and infrared photos of crops of all kinds, rangeland, forest and wild lands, urban and recreation areas. After polling the agents and researchers, we came to the conclusion that we had: (1) learned a great deal about some of the uses and techniques of aerial photography, and (2) barely scratched the surface of its potential applications. Here are some of the things we found out.

Aerial photography using any film can increase one's knowledge.

Patterns in soils and vegetation that are not readily apparent to the person on the ground show up clearly from the air. Even though a farmer may be aware of a thin spot in a crop, its size and shape are much more exactly defined by an aerial photo. Often an area of intermediate growth around the thin spot will prove to be much larger than the farmer realized by ground obser-

vation only.

Interpretation of aerial photos requires good ground information.

The site should be examined on the same day the aerial photos are made. As soon as the photos are processed, interpretation of patterns can be made from notes taken during the ground examination. Unexplained patterns may require re-examination of the site and perhaps collection of soil or plant tissue samples for laboratory analyses.

Color pictures are usually preferable to black and white. Infrared color photos may or may not give more information than color photos.

We like the matched color and infrared color photos because they give a record of how the scene looked to the eye, plus the possibility of greater interpretation from the infrared. Often we see the same patterns with each film, but they are usually plainer and more contrasting in the infrared picture. Only occasionally were we able to see patterns in the infrared photo that we could not see in the corresponding color one. Nevertheless, we think the infrared is valuable because of its greater contrast, and its greater ability to penetrate haze.

Nutrient deficiencies and non-uniform fertilizer application show up well.

Deficient yellow leaves in color photos appear white in infrared photos. The contrast between deficient leaves (which show up white) and healthy ones (which appear red) on an infrared photo is much greater than the contrast between the corresponding yellow and green leaves in a color photo.

Patterns of aerial fertilizer application, which is particularly susceptible to non-uniform spreading, are easy to trace in an infrared photo.

Sprinkler irrigation patterns are easy to spot.

Sprinkler-irrigated areas can suffer from non-uniform water coverage due to winds or improper system design. Patterns which are barely visible on the ground are amplified in the aerial view. Again, the infrared provides greater contrast.

Burned areas are particularly visible on infrared film.

The green living vegetation versus gray ash on color photos becomes red versus black on infrared.

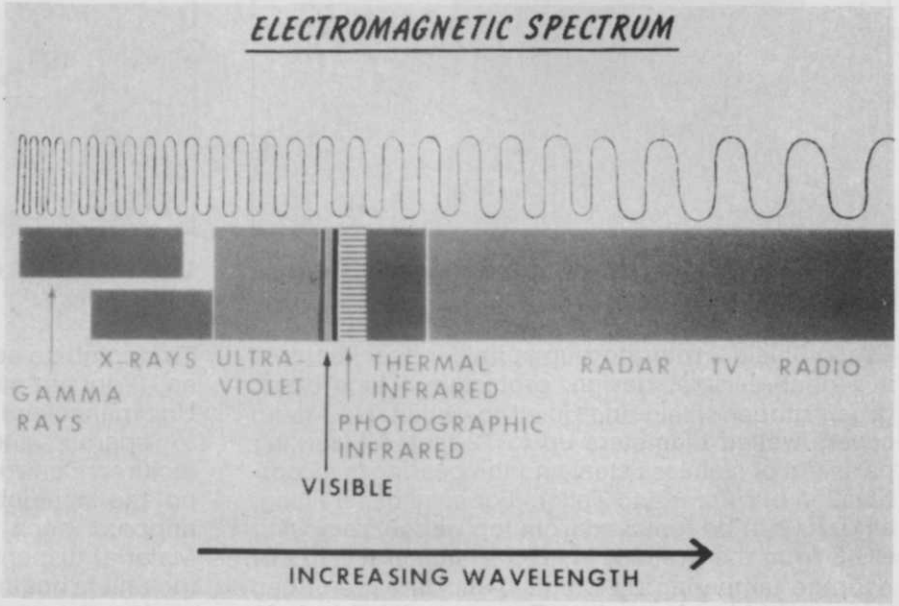
We did not accumulate much experience with diseases, insects or weed infestations. We think there will be times when infrared color photography will be invaluable in diagnosing the spread of these plant competitors. There may also be cases in which infrared will not be as much help as we would like. A great deal of work needs to be done on the photographic characteristics of many plants under controlled conditions including various kinds of stress.

On the operational side, we found it quite easy to get good aerial photos from hand-held 35 mm cameras. We recommend a high wing plane with a window which can be opened wide. (On Cessna 150 and 172 aircraft, a small brace can be disconnected to allow the window to swing up parallel to the wing.) Removing a door from the aircraft is not recommended for anything but short flights on warm days. A cold wind in the cabin is distracting to both pilot and photographer. Approximately vertical photos can be made by banking the plane about 45 degrees when directly over the photo site. However, oblique photos are often just as good, and are easier for both photographer and pilot.

A No. 12 or No. 15 Wratten filter or equivalent is used with infrared color film to filter out blue light. Exposure settings are more critical than for ordinary color film since light meters do not measure infrared radiation. You can come close, however, by setting your light meter at ASA 100. Take one infrared color picture at the camera setting your light meter calls for, and one each at the F-stop above and below this setting. One of your pictures should be properly exposed. Use a shutter speed of 1/250 second or faster for aerial photography.

Infrared color film requires some special handling because it is easily damaged by heat. Never allow the film to become warmer than ordinary room temperature. An afternoon in a hot car can ruin it. Ideally, the film should be kept frozen before use, and should be warmed to room temperature in the cannister (to prevent moisture from condensing on the cold film) a short while before use. The entire roll should be exposed in one day, the film removed and processed immediately. Try to assure that the film will remain cool while on its way to the processing laboratory. If a roll is not completed, it is better to waste the unexposed frames than to leave the film in the camera for another time.

With these suggestions, anyone should be able to take reasonably good infrared color aerial photos. A little experimentation on camera settings and aircraft altitudes may be necessary to obtain the best results. Almost everyone knows someone who flies, and most pilots will welcome an excuse to fly. Even if you have to charter a plane and pilot, the cost of an hour or two of flying may be cheap in relation to the usefulness of your aerial photos.



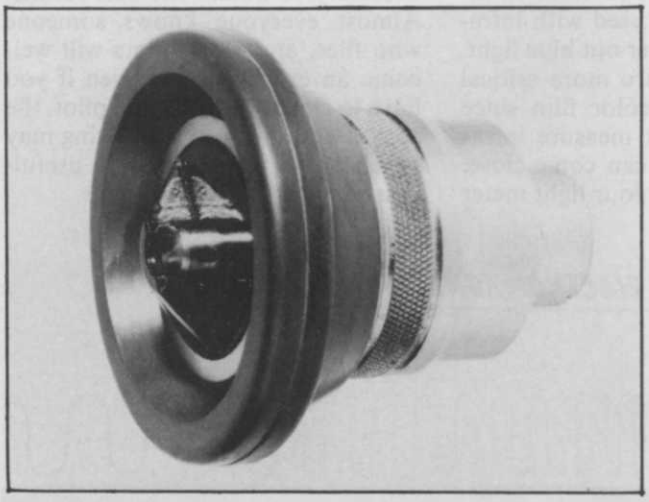
The electromagnetic spectrum is composed of many useful forms of energy. Visible light covers only a small part of the total energy band; a large part of the infrared portion of the band is thermal infrared.

TS-20 TREE SPADE: Vermeer Manufacturing Company, Pella, Iowa.

Smallest in the Vermeer line, the new TS-20 Tree Spade is designed for low-cost high-production tree balling operations. Can be used by nurseries, tree farms or landscapers who grow large quantities of young trees, bushes or shrubs for resale, or by cities and parks for large-scale tree "banking" projects. TS-20 hooks up with tractor for single unit mobility. Hydraulically-controlled steel spades sink 18 inches below surface to form firm 20-inch diam. tree ball. For more details, circle (701) on the reply card.

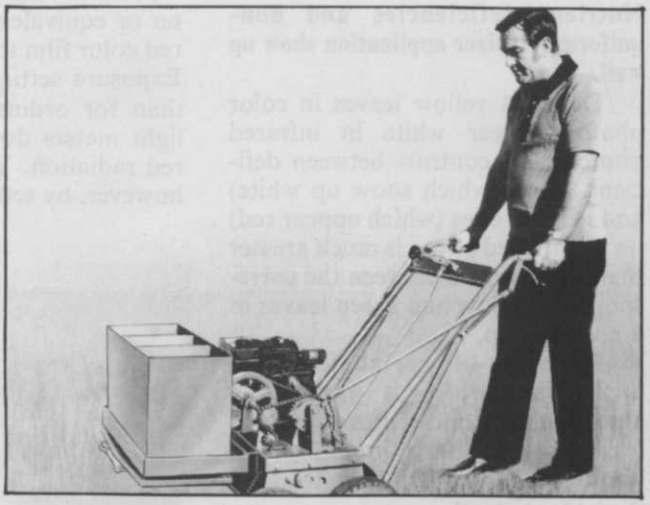
PRO INDUSTRIAL SPRAYER: Root-Lowell Corporation, Lowell, Mich.

Newest addition to the PRO line of chemical applicators is a 3-gallon capacity compressed air sprayer with 3¾ inch diam. top opening for fast clean-out. New polyethylene pump piston cup is said to be inert to most all solutions. Other features include 42 inch rayon reinforced hose, large brass pump cylinder for fast pumpup, galvanized steel tank with electrically welded seams, rotating control valve that works in any position, and swivel nozzle with fan and adjustable cone pattern. For more details, circle (702) on the reply card.



GS-3 SPRINKLER HEAD: L. R. Nelson Corporation, Peoria, Ill.

Green Shield 3 rotor pop-up sprinkler head features a vandal-resistant design, protective 4 inch diam. green rubber shield and quiet operation. New head covers wetted diameters up to 72 feet. All working parts are of stainless steel and the bearing is a combination of rubber and Teflon. For ease of servicing, all parts can be removed from top without removing GS-3 from the ground. There are no screws to encourage tampering by vandals, and threads of cap ring are hidden from view. For more details, circle (703) on the reply card.



LAWN MAKER COMBINE: Lawn Maker, Inc., Farmingdale, N.Y.

This combine aerates and simultaneously dispenses any 3 dry turf materials at different application rates. Unit maneuvers easily in tight quarters and is simple to operate and transport, according to manufacturer. Controls of this self-propelled combine are on the handlebar. Three heavy-gauge aluminum hoppers each have 1300 cubic inch capacity. Material dispensing is automatically stopped when the unit is not in motion. powered by a 4-cycle, 3 hp engine, the combine can cover about 22,000 sq. ft. per hour. For more details, circle (704) on the reply card.

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Banvel pre-mix combinations containing 2,4-D and 2,4,5-T are available in either oil or water soluble formations, lets you eliminate *selectively* tough brush, vines and broadleaf weeds that other herbicides often miss.

With this choice, the herbicide can be matched to type of vegetation, season, location, soil type, topography, environment, and other considerations. See your Velsicol representative or herbicide applicator for details.

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WORKING FOREMAN — We are a medium sized, midwestern, full service tree expert company, looking for an experienced crew foreman. Should be familiar with production trimming and removal. Modern equipment, paid hospitalization, vacation, and holidays. Salary open. Please send resume and salary requirements and any questions to Box 121, Weeds, Trees & Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

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MISCELLANEOUS

TREE APPRAISALS, Surveys, loss evaluations and expert consultation services. For names of members of the American Society of Consulting Arborists, Inc., throughout the country, contact: Executive Director ASCA, 12 Lakeview Ave., Milltown, New Jersey 08850.

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RIGHT-OF-WAY brush control business, netting $35,000 to $45,000 annually, total investment $125,000.00. Located in midwest. Write Box 122, Weeds, Trees, and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

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GREENSKEEPER-GROUNDS SUPERINTENDENT. Prefer East Coast. B.S. Degree from Cornell University in Horticulture. Operated own business for many years. Resume upon request. Write: Robert Woesner, 450 Chestnut Lane, East Meadow, N.Y. 11554.

Automatic Irrigation Takes Advantage of Rain

Most irrigated parts of Texas are looking for better ways to save water. One of the most intriguing ideas of how to do this is to automate drip and subsurface irrigation systems.

Both these systems are proved water savers. To automate them so water is only applied at crucial times should really save water. And it does.

The system was designed by agricultural engineers and soil physicists with the Texas Agricultural Experiment Station. One of its key parts is a control called a switching tensiometer (a soil moisture sensor), according to Dr. Charles Wendt, soil physicist at Lubbock who led the work.

The scientists bury the tensiometer in the ground at root zone level for whatever crop they want to water. The instrument takes a continuous reading of the water content of the soil, and when a pre-set degree of dryness is reached, it cuts on the irrigation system. Then, when the soil reaches a certain degree of wetness, this same control shuts off the system.

Part of the beauty of this automated irrigation system is that it is true supplemental irrigation; it takes full advantage of any rain that occurs.

Both drip and subsurface irrigation save water by placing it only where plants are growing. This leaves the area in between dry and ready to store any rain, even if plants have just been watered.

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GREEN INDUSTRY ASSOCIATIONS:

WEEDS TREES and TURF will be polling leading organizations in the Green Industry this month. We would like to know what your organization has accomplished in 1974 and what your goals are for 1975. Reports will appear in the December issue of WEEDS TREES and TURF.

His biggest problem was getting the job.

When John was hired five years ago he had good skills but I was apprehensive about his working here. The first thing I thought of was our workers' compensation rates. And then there was the question of how he was going to get around, how he'd get along with the other employees, and if he'd be too sick to handle the job on a daily basis.

Let me tell you he's worked out just fine. He's done his job well, my workers' compensation rates have actually gone down, and he's sick less than anyone in the whole place. You know, in the beginning I thought I was doing the guy a favor; now I've found that John has really done me one.

The President's Committee on Employment of the Handicapped

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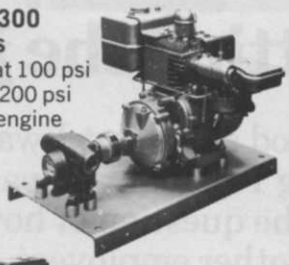

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trimmings

While most scientists are looking for ways to control the gypsy moth, USDA's Agricultural Research Service (ARS) is funding a study to find out why there haven't been any recent moth population explosions in New Hampshire. The ARS will provide $8,200 for this one-year study and hopefully determine to what extent natural enemies of the gypsy moth stabilized the population. The New Hampshire scientists will review parasite introduction and recovery programs, as well as parasite effectiveness. They will also examine past records to find gypsy moth population explosions and subsequent collapses, the parasitism before, during and after each outbreak, changes in tree and insect complexes and kinds, dosages and effects of chemical applications.

At least someone reads the magazine. An article in the August issue of WEEDS TREES AND TURF about the tornado damage inflicted on parts of Louisville, Kentucky has aroused the humanitarian interests of a few people in the Green Industry. Sierra Chemical Co. pledged 20 commercial cases of Agriform Planting Tablets to Trees, Inc., of Louisville, to aid in their reforestation program of Cherokee Park.

Alphabetical guides to frequently violated general industry and construction job safety and health standards are now available. The pocket-size digests were developed to help employers, particularly those with small businesses, determine what rules they should follow to comply with OSHA regulations. The booklets summarize OSHA requirements for guarding against particular occupational hazards and list in detail references to particular sections in OSHA standards where the user may find the complete requirements. Single copies are available free on request from any of OSHA's regional offices in Boston, New York City, Philadelphia, Atlanta, Chicago, Dallas, Kansas City, Mo., Denver, San Francisco and Seattle.

Moon trees, grown from seeds that went to the moon and back with Astronaut Stuart Roosa aboard Apollo XIV, have been presented to the City of New Orleans for planting in Louis Armstrong Memorial Park on the edge of the historic Vieux Carre. Dr. John C. Barber, director of the Southern Forest Experiment Station, presented the trees to Mayor Moon Landrieu at a ceremony in front of Perserverance Hall. The seedlings were grown by forest researchers following their return to NASA's Manned Space Center, Houston, Texas, after the Apollo XIV flight early in 1971.

Industrial Research Magazine's 12th annual I-R 100 Awards competition presents awards to companies developing the year's most significant technical products on the basis of their "importance, uniqueness and usefulness." One product receiving recognition was developed by Oceanography International Corp. The Zapper III directs microwaves into the soil to control weeds, grasses, fungi and nematodes. Seeds or plants are killed by accelerated motion and internal damage triggered by the microwaves. In tests conducted by the USDA, the Zapper has shown substantial increases in crop yields.

"A pesticide cornucopia," said chemist Martin Jacobsen as he discussed a number of compounds obtained from the American coneflower. The plant is a member of the thistle family. Its roots produce an unusual compound that mimics an insect hormone, thereby offering potential means for another way to control pests. Earlier, Jacobsen had identified another compound, echinacein, from the same plant, which killed house flies, mosquito larvae and German cockroaches.

"Chad," Dr. L. C. Chadwick, was inducted into the Ohio Agricultural Hall of Fame during the Ohio State Fair in late August. He served as executive secretary of the International Shade Tree Conference for 32 years and still serves the Ohio chapter in the same capacity. Instrumental in re-establishment of the International Plant Propagators Society, he served as its president in 1953-54. Recently, Chadwick served as president of the American Society of Consulting Arborists and currently is chairman of the Columbus Street Tree Commission.

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